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**Illustrated.*

Some Remarks on Utah and Nevada

According to newspaper reports the management of the Utah Copper Company has bowed to criticism, and henceforth is going to allow in its accounting 7½c., instead of 5c. per ton, for deferred stripping charges, and is going to write off something for wear and tear of its plant. As to the latter point it has been urged that the mill is still so new that repairs and renewals have not yet been of especial moment, which may be true, but if they are not to appear unduly large a little later on there must be early accumulated some fund for their equalization.

As to the stripping charge, the management still claims that 5c. per ton will in course of time extinguish the “prepaid account.” We hope this may prove to be true. Also that the present mill will last for 20 or 30 years. But it is well to guard against contingencies, and if too much be deducted from gross earnings it will always be easy to pay over to the stockholders any surplus that may be unnecessary for safety. In this respect it is better to pay an extra dividend than to create a disappointment.

The financial press has lately been trumpeting the marvelous record of Nevada Consolidated in producing at a cost of 5¾c. per pound of copper and making far in excess of present dividend requirements on a 12½c. copper market, etc.

The record of Nevada Consolidated is indeed marvelous. No one will deny its position as one of the great mining successes of the age, reflecting enormous credit upon Mr. Bradley and Mr. Requa, who developed it, Mr. Channing, who contributed materially in bringing it to eastern notice, Mr. Yeatman, who has directed its plans for mining and smelting upon an immense scale, and Mr. Lakenan, who is in charge of the work in Nevada. But nevertheless, it is well for enthusiasts to bear in mind that Nevada Consolidated is at present extracting its best and most easily mined ore and is operating with a brand new plant, just properly seasoned. When we come to strike an average, 10, 15 or 20 years hence, the engineers who estimated a production cost of 7c. per lb. will not appear to be too high, as they do at present.

The Location of Oil Lands

Another example of the absurdity of our present laws for the location of mineral land, and the necessity for a revision thereof, is afforded by a recent decision of the General Land Office with respect to the patenting of land in oilfields. The Land Office has decided that such land cannot be patented unless discovery has preceded location. Under this ruling it is not lawful to locate claims unless oil seeps from the ground, or unless drilling has discovered oil in advance of the filing of any papers. Both of these conditions are practically prohibitive. In oilfields the cases where seepage of oil or the bituminous residuum are manifest on the surface are rare, while no prospector is disposed to risk his money in drilling upon public land to which he has no title whatever.

This ruling has, of course, aroused a storm of protest among the oil men in California. The condition existing in that State is quite different from what has prevailed in most of the other oil-producing States. In California the oil discoveries have been to a large extent made on public lands, considered to be open for general entry. In Louisiana, Texas, Oklahoma and other States, the oil discoveries have generally been made upon lands that had previously passed into private hands.

Unionism at Lake Superior

According to the newspaper reports, emanating from Butte, the Western Federation of Miners contemplates a campaign to compel the mining companies of Lake Superior to pay the same scale of wages as in Montana. One of the Federation leaders is credited with the following remarks:

"The Calumet & Hecla and other companies in the Lake Superior district at present enjoy an unfair advantage over the Amalgamated and other companies at Butte, and we propose to organize the Lake country and thus remedy this discrimination against Butte. All the work in Michigan is done by contract and the miner must buy his own tools, powder and supplies at the company's store. Once in a while the miner may make living wages, but often he comes out in debt under the Michigan system. The company stands no loss.

"On the other hand, look at the condition in this district. The Amalgamated pays from $3.50 to $4 per day, according to the price of copper, and it makes no difference to the miner whether there is ore or not. If rock is drilled through without results, why, the Amalgamated stands the loss. When we unionize the Lake district contract work will be done away with and the men will not have to patronize the company stores. Under our jurisdiction the Michigan miners will be benefited financially and every other way."

Thus does the Western Federation of Miners propose to take a hand in regulating the cost of producing copper. Its solicitude for the poor Amalgamated, laboring under an unfair disadvantage, is enough to make a crocodile weep.

Of course, the statements quoted above and the arguments in support of them are rank nonsense. Everyone of good sense knows that the miners of Lake Superior are as well off, if not better, than those of Butte. Lake Superior is a region where many miners own their own homes. It has a settled population. Many of the men working in those mines today are the sons and grandsons of miners working in the same district. A comparative glance at the living conditions in Lake Superior and Butte is all that is necessary to show the relative welfare of the miners in the two districts. In 1907, when an advance in wages occurred at Butte and there was an extraordinary demand for miners, many men went there from Lake Superior to try their fortune. Later on they were glad to return to Lake Superior.

Iron Making Capacity

Reference has frequently been made to the increased iron-making capacity resulting from the extension of old plants and the construction of new ones in the United States during the last three years. We have estimated our present capacity for making pig iron at 40,000,000 tons a year, or about 14,000,000 tons above the highest production ever reported. This estimate is confirmed by the full and careful figures of the American Iron and Steel Association, which have just been published. These tell an extraordinary story of growth and development.

At the close of 1907 there were in existence blast furnaces having a yearly productive capacity of 34,834,000 tons of pig iron, in round figures. From this is to be deducted 287,000 tons for furnaces which have since been abandoned or dismantled and are thus permanently out of service; and 1,795,000 tons for stacks which have not, or could not be operated even during the hight of the boom, and which Mr. Swank, the experienced statistician of the association, believes will never be operated again. These deductions leave a total capacity of 32,752,000 tons. But during 1908 and 1909 there were new stacks built which can produce 4,468,000 tons yearly, and old ones rebuilt or enlarged which can make 925,000 tons. These additions bring the total up to 38,145,000 tons on June 30, 1910. This statement, as indicated above, eliminates all those stacks which, owing to their present condition or location, will probably be soon abandoned.

Moreover, on June 30 last, work was in progress on a number of new stacks which, when completed, will be able to make 2,082,000 tons; and these additions will bring the total production capacity early in 1911 up to 40,228,000 tons of pig iron yearly, provided all furnaces were active. As a rule, however, even in the most strenuous times, about 10 per cent. of the existing stacks must be out of blast for repairs or relining; so that the actual make could hardly be over 36,000,000 tons. This quantity is about 10,000,000 tons more than the greatest recorded yearly make of iron in the United States.

Two things are evident from this statement. The smaller and older furnaces, which are more costly to operate, will be gradually crowded out of existence by those plants which can make pig iron cheaply, owing to their size and equipment or their ability to secure ores and fuel at comparatively low prices. There must also be a halt in the building of new stacks until the consuming capacity of the country grows up to its ability to produce. This growth is steadily in progress as population increases, and as the tendency to use iron and steel in place of other material advances. Both of these increases are strong factors, but it will take some time for them to absorb the 10,000,000 tons of surplus above shown.

A marked feature in the increase of iron-making capacity is that nearly all the new furnaces have been built by companies which consume their own output in making steel or other finished material. The old-time merchant furnace, which sells its make of pig iron to manufacturers, is becoming each year a less important factor in the trade. Those which remain at work are chiefly interested in the making of basic and foundry pig iron.

The report that the Miami Copper Company has made a five-year contract with Cananea for the smelting of its concentrate is interesting. Ores are usually despatched from Mexico to the United States for smelting, not in the opposite direction. However, the shipment of raw, cupriferous material from this country into Mexico is not without precedent, matte having been sent from El Paso to Aguascalientes for many years. In these cases the reason is, of course, the need for a special kind of ore, and the blister copper is returned to the United States for refining.

CORRESPONDENCE and DISCUSSION

Views, Suggestions and Experiences of Readers

Standards of Work

In the JOURNAL of August 13 an article entitled "Standards of Work" suggests a few remarks. It has been my observation that even in a stated district, under normal conditions, the influences brought to bear on labor are so great in number and so varied in character that no standard of value, except locally, can be assumed.

PERSONAL ELEMENT

The element of individual personality must necessarily be a large factor, not only so far as it represents the ability and willingness of the laborer himself, but also the ability of those in charge to influence the laborer to exert his maximum effort.

That one shift boss may be more successful than another under the same conditions and with the same crew is a sufficient testimonial of this fact. The factor of personality does not cease entirely with him. It must necessarily extend through the entire organization, more or less, and it is not difficult to reason how the attitude of a board of directors may leave its ultimate effect upon results accomplished.

CONDITIONS AT VARIOUS MINES NOT IDENTICAL

Mr. Oke relates one case where one ton of rock was broken for every foot drilled for a given period of time. Were this record to be of value it would be necessary to state the nature of the work in which this was done; character of the rock; all working conditions, whether in damp or wet ground, or dry and dusty; temperatures; ventilation; size of drills; name of machine used, or weight of hammers if it be a drilling record; etc. etc., and lastly the impossible—all factors of personality entering into the case.

Even in the same district, such data would be of doubtful value, even if results be recorded over periods of time; for it is the rare exception, and not the rule, if identical conditions be found to exist in two mines of the same district.

In the mine where such results are recorded they are of use only in a comparative way, and the superintendent or engineer using them must make allowance for every condition not identical to that under which the results were recorded.

SAMUEL H. DOLBEAR.

Johannesburg, Cal., Aug. 18, 1910.

Feldspar as a Fertilizer

The late Franklin R. Carpenter, of Denver, Colo., secured a United States patent, No. 959,841, on a process for rendering the potassium content of feldspar soluble, thus making it available for use in commercial fertilizers.

At present all potash fertilizers are imported from Germany, and if this new process be commercially feasible, it would make this country independent of foreign importations. The principal item is the cost of treating the rock in the manner described as follows: "The process of preparing rock containing potash compounds for use in agriculture consists in intensely heating the same and then suddenly cooling the heated material to change its molecular structure, and render the compound soluble and available for plant life, and then finely grinding the same for use."

As far as I know, only laboratory tests have been made confirming the claims made in the patents. I can say, however, that the laws of most States in which artificial fertilizers are largely sold demand that the potassium content in mixed fertilizers must be in water-soluble form. The resultant product of this process is not water soluble. It would occupy about the same position as does the untreated phosphate rock. Dealers discourage the use of raw phosphate rock, but agricultural experiment stations for the last few years have begun to recommend it generally.

There is an abundance of orthoclase actually containing 12 per cent., or more, potassium oxide. The new discovery, if practical, is particularly interesting now in view of the legislation recently passed by the German government, and many of the JOURNAL readers, of whom I am one, would appreciate a discussion of the feasibility of the new process.

F. H. NAGEL.

Milwaukee, Wis., Aug. 15, 1910.

[The Department of Agriculture, in *Bull.* No. 104, gives the results of a series of experiments to determine the value of ground feldspar as a fertilizer. The evidence so far obtained appears to indicate that under certain conditions and with certain crops feldspar can be made useful if it is ground sufficiently fine. The question is still open, and systematic experimentation is the only possible method of obtaining conclusive information on the subject. The tests given in the above bulletin are on raw feldspar. No data are given along the line indicated in Dr. Carpenter's patent.—EDITOR.]

New Arizona-Sonora Railroad

The article on "A New Arizona-Sonora Railroad" in the JOURNAL of Aug. 20 is most important and of especial interest to me because it is the culmination of my hopes in relation to the opening up of northwest Sonora.

In 1899 I examined the property of the "National Mexican Mining and Development Company," situated six miles from El Plomo in the Altar mining district. The property of the company consisted of a group of claims, known as the Leones, containing a free-milling gold ore, and the Ruizena, which had a high-grade concentrating ore which had been shipped to smelting works at El Paso and Pueblo.

SECURING THE ABUNDANCIA MINE

After completing my examination of company's property my attention was called to an abandoned mine near the village of El Plomo, known as Abundancia.

A shaft of about 100 ft. and a drift at this depth of 200 ft., and prospecting pits, surface crosscuts and bold outcrops for nearly a mile led me to advise my clients to purchase the property. On our return to Tucson we found the owners and a contract for the purchase was drawn up. I then learned that W. P. Blake had examined and reported on the property in September, 1896.

At the north end of the property the valuable minerals are cerussite and anglesite to a depth of 100 to 120 ft., where galena begins to occur in detached masses. Gold and silver are always present but do not increase with the percentage of lead. At the south end of the property copper carbonates giving way to sulphides in depth appear to predominate. The treatment of the Abundancia ore therefore means a smelting plant—I now quote from my report of 1899:

"The opportunity for controlling the mining industry of the district tributary to Altar lies primarily in the development of the Abundancia mine and the consequent production of silver- and gold-bearing lead ores which must result in the establishment of a smelting plant at or near El Plomo. La Abundancia is the key to the situation; therefore its value must be unequivocally determined in advance.

VALUE OF RAILROAD TO PORT LOBOS FORESEEN

"The other element which enters into the proposition is fuel, and that presents greater difficulties than the ore question. For a permanent and large plant coke will have to be used. Delivery by rail to Tucson or Santa Anna and then by wagon to El Plomo would be prohibitory. The only solution will be to bring it in from some port on the Gulf of California, and the nearest available point appears to be Port Lobos, about 85 miles from El Plomo. The construction of a railroad from Tucson or some other point on the Southern Pacific would open a large mineral and agricultural country. The importance of establishing a port on the Gulf applies not alone to the fuel supply, but also to mining supplies and general merchandise. If the smelting were restricted to the production of copper matte and base bullion it could be shipped to Atlantic ports or Europe over the Tehuantepec railroad."

The preliminary reports on the Arizona, Mexico & Gulf of California railroad, issued by the Development Company of America, give a clear and admirable statement of the existing conditions and what may be expected as the outcome of the building of the railroad. J. N. Curtis, the mining engineer employed by the company, has made a report on the existing and prospective mining conditions, which gives evidence of a close observer. In this connection, however, I wish to correct a statement in the published article; the average value of the Abundancia ore should read $10 to $20 in place of $20 to $23 per ton. The concentrating plant consisting formerly of Harz jigs and Frue vanners, is now a wreck.

After the property was taken over by the Illinois Development Company, the work was confined to prospecting the Abundancia. The exploration work was continued for 11 months. During this period 800 ft. of levels were driven and 250 ft. of shaft sinking. The 100-ft. level was driven from the north and south a total distance of 800 ft. As far as developed no barren ground was encountered. At this stage the company ordered the suspension of all work. The entire expenditure amounted to $30,000 for machinery, supplies, labor and salaries. The property has lain idle for four years.

With an expenditure of $50,000 the Leones mine, free-milling $10 ore, could with a 10-stamp mill put through at least 50 tons per day within 12 months.

GEORGE W. MAYNARD.

New York, Aug. 26, 1910.

The second gram of radium has been produced in the government laboratories at Joachimsthal, Austria-Hungary and is available for shipments.

? QUESTIONS and ANSWERS •

COPPER IN BABBITT METAL

Do any of the babbitt metals contain copper?

M. S. L.

Practically all so called babbitt metals contain copper. Kent says there are few babbitt metals that are made according to the original formula of Babbitt. The best sources of information give the original proportion of the metal as 50 parts or 89.3 per cent. tin, 2 parts or 3.6 per cent. copper, and 4 parts or 7.1 per cent. antimony. Another authority gives 83.3 per cent. tin, and 8.3 per cent. each of copper and antimony.

VALUE OF CHINA CLAY DEPOSIT

I have recently found what I believe to be quite an extensive deposit of china clay not far from Washington, D. C. I want to get in touch with someone who can inform me as to whether the deposit has any commercial value. The bed is covered by a layer of soil 2 ft. in depth. Do you suppose that the potteries at Trenton, N. J., Wheeling, W. Va., or East Liverpool, Ohio, could use the clay, or have these potteries their local deposits from which they obtain their clay? Is there any market in New York or elsewhere to which china clay is sent?

R. F. B.

In order to determine the quality of the clay, a sample lot should be washed and floated to remove the foreign impurities, and then shipped to some pottery to be tested in a practical manner. All china clays must undergo this treatment before they can be used. The commercial value of the deposit is also largely determined by physical conditions, such as the thickness of the bed, proximity to transportation, etc. The price f.o.b. Trenton, N. J. ranges from $4 to $12 per ton, according to quality. Analyses are not entirely reliable guides to the suitability of the clay. The Trenton Potteries Company and the Golding Sons Company, both of Trenton, are users of this material.

Chronology of Mining for August

Aug. 1—Copperton mill, Bingham cañon, Utah, closed permanently.—Strike of coal miners of the Southwest declared, affecting 38,000 men.

Aug. 2—Explosion in coal mines of the Cerro de Pasco company in Peru kills 60 men.

Aug. 5—Fire destroyed tipple and power house of Pennsylvania Coal and Coke Company, at No. 9 mine, near Cresson, Penn. Loss, $100,000.—Bandits held up stage and stole bullion shipments of the Socorro and Ernestine mining companies in New Mexico.

Aug. 6—Balaklala smelting plant at Coram, Cal., closed to await completion of Cottrell apparatus for eliminating smoke difficulties.

Aug. 10—Fire does surface damage of $100,000 at Best & Belcher mine, Comstock lode, Nevada.

Aug. 12—A fire at the Granby mine in British Columbia destroyed buildings valued at $70,000.

Aug. 13—Midget-Bonanza mill, Cripple Creek, Colo., struck by lightning and burned.

Aug. 18—Beck Tunnel Company, in Utah, sues the Uncle Sam Consolidated for $300,000 for alleged ore trespass.

Aug. 20—U. S. Land Office ruled that lands in the oilfields cannot be patented unless discovery precedes location.—McCabe and Gladstone properties in Arizona sold to F. M. Murphy, $150,000.

Aug. 21—Forest fires in the Northwest States damaged mines and mining towns, Wallace, Idaho, being partly destroyed.

Aug. 23—The Anaconda company has brought suit against the Butte-Ballaklava company to recover for ore trespass alleged.

Aug. 27—Meeting of mining men in Denver to protest against Nelson bill before the U. S. Senate.

Aug. 29—Associated Oil Company bought the McMurray and Hoeppner holdings in the Midway, California, field for $3,000,000

August Dividends

The accompanying table shows the amount per share and total amount of dividends paid during August, 1910, by a number of the leading mining and metallurgical companies in the United States, Canada and Mexico.

U. S. Mines.	Situation.	Amt. per Share.	Total Amt. Paid.
Alaska Mexican, g.	Alas.	$0.30	$54,000
Alaska Treadwell, g	Alas.	1.00	200,000
Alaska United, g.	Alas.	0.10	18,020
Amalgamated, c.	Mont.	0.50	769,439
Bunker Hill & Sullivan, l.s.	Ida.	0.30	98,100
Butte-Ballaklava, c	Mont.	0.50	210,000
Elkton Con., g.	Colo.	0.01½	37,500
Hecla, s.l.	Ida.	0.02	20,000
Homestake, g.	S. D.	0.50	109,200
International Nickel, pfd.	N. Y.	1.50	133,689
Pearl Con.	Wash.	0.01	19,707
Pioneer, g.	Alas.	0.03	150,000
Snow Storm, c.g.	Ida.	0.01½	22,500
U. S. Industrials.	**Situation.**	**Amt. per Share.**	**Total Amt. Paid.**
Jeff. & Cl'f'ld Coal, cm.	Penn.	$2.50	$37,500
Lehigh Coal & Nav.	Penn.	2.00	764,520
U. S. Steel, pf.	U. S.	1.75	6,304,915
Foreign Mining Companies.	**Situation.**	**Amt. per Share.**	**Total Amt. Paid.**
Crow's Nest Pass, coal.	B. C.	0.25	40,000
Dolores, g.	Mex.	0.22½	90,000
El Rayo, g.	Mex.	0.03	10,800
Lucky Tiger, com., g.	Mex.	0.05	37,500
Mines Co. of America.	Mex.	0.03	60,000

Daily Production of Copper

The accompanying table gives the daily production in North America of both refined and blister copper since December, 1909. The statistics for the former are complete, while those for the latter are incomplete, covering only the companies reporting. It will be noted that for blister copper April shows the largest daily production since last December. While June shows a falling off of over 200,000 lb. daily, yet it is not so low as the previous months. While the figures are not all in for July, enough have been received to indicate that the daily rate for this month will not be much less, if any, than June. The effect of the recent program of curtailment is, of course, not yet apparent in the tables.

DAILY PRODUCTION OF COPPER.

	Blister.	Refined.
Dec., 1909	3,193,826	3,800,924
Jan., 1910	3,297,261	3,759,589
Feb., 1910	3,047,819	4,025,446
Mar., 1910	3,544,457	3,873,144
Apr., 1910	3,786,757	3,915,921
May, 1910	3,703,156	3,975,563
June, 1910	3,570,753	4,240,396
July, 1910	.....	3,818,400

With reference to the refined copper, there has been a gradual increase to 4,240,396 lb. daily for June. The daily production for July dropped off over 400,000 lb. It will be noted in these figures that any sudden change in blister copper is not noticed in the refined copper until about two months later. The reason for this is that it requires about this interval to pass from the smelteries through the refineries.

Well No. 79 of the American Oilfields Company, California

LOS ANGELES CORRESPONDENCE

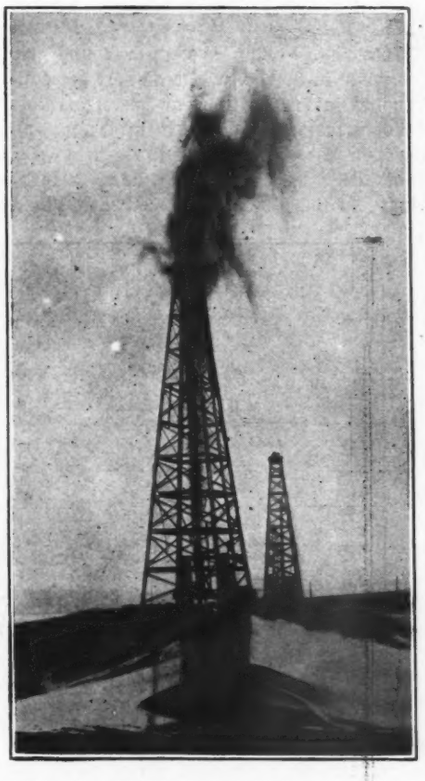
The accompanying illustration is from a photograph of well No. 79 of the American Oilfields Company, in the Midway field, Kern county, California. At the time the photograph was taken, Aug. 6, the well was gushing at the rate of 40,000 bbl. per day; the crown block had been knocked off and oil was spouting 200 ft. above the ground. Within the past few days the flow for short periods has been as high as a 50,000 bbl. rate.

This well has been a remarkable performer. Drilling was started in the latter part of April, of the present year, and the well was completed in 18 days. At 820 ft. a fine-grade of oil sand was encountered; drilling was continued in this material to 1000 ft., the present depth of the well. One string of 12½-in. casing was used. No water was encountered and the oil shows a gravity of 22 degrees.

RECORD OF NO. 79 RIVALS THAT OF LAKEVIEW GUSHER

Following is the official record of this gusher: Well No. 79 brought in in May, 1910, at 1000 bbl. per day, increasing to 3000 bbl. by July 25. July 26, 8000 bbl.; July 27, 7000 bbl.; July 28, 4000 bbl. and making a great amount of sand; July 29-30, 10,000 bbl.; July 31 to Aug. 4, 8000 to 8600 bbl., with tremendous gas pressure; Aug. 5-8, 15,000 to 16,000 bbl., at times flowing at the rate of 20,000 bbl. per day. On Aug. 9 the well sanded but soon resumed flowing at an increased rate.

Up to the present date, Aug. 21, the average has gradually worked up to 25,000 bbl., the flow at times having reached a rate of 50,000 bbl. per day.



WELL NO. 79, MIDWAY FIELD, CALIFORNIA

Well No. 68 of the American Oilfields, situated about 1200 ft. northeast of the No. 79, is fast assuming the proportions of a gusher. This well was brought in about 10 days ago and is now flowing at a rate of 6000 bbl. per day and making a great amount of sand.

Although well No. 79 of the American Oilfields is now spouting a quantity of oil slightly in excess of the output of the great Lakeview gusher, the former has not had the spectacular career of its neighbor. The Lakeview is now flowing between 20,000 and 22,000 bbl. per day. For about three months it averaged about 50,000 bbl., while the greatest recorded flow was at the rate of 92,000 bbl. per day.

The Salt Lake Conservation Meeting

The governors of Utah, Washington, Wyoming and Idaho, also representatives of the governors of Oregon, California, Colorado, Nevada and Minnesota met in Salt Lake City, Aug. 18, to discuss conservation. The meeting was for the purpose of deciding upon a course of action to be followed by the Rocky Mountain and Pacific Coast States, at the National Conservation Congress, which will be held in St. Paul, Sept. 5 to 9, and to place before the St. Paul congress the views of the States most vitally concerned. A platform of principles was decided on, the substance of which is:

(1) That the National Congress adhere to the doctrine of Abraham Lincoln that the public lands are an impermanent national possession, held in trust for the maturing States.

(2) That the State government is capable of devising and administering laws for the conservation of public property, and that the national and State government legislatively coöperate to the end that within a reasonable period the State government be conceded the full administration of such conservative laws as may be found to be best adapted to the varying conditions of the several States.

(3) That the experience of the conservation States shows that dispositions of public property made under existing national conservation laws have tended to intrench monopolies, menacing the common welfare, and that modifications of such laws should be promoted by the conservation congress.

(4) That the elimination from the national forest reserves of all homestead and untimbered grazing land is immediately expedient.

(5) That the use and control of all power adhere of right in the States, within restrictions insuring perpetual freedom from monopoly.

(6) That the privilege of American citizens to seek and develop mineral wealth wherever it may be found should be fully amplified and secured by laws.

(7) That the idea of deriving Federal revenue from the physical resources of the States is repugnant to that adjustment of constitutional powers which guarantees the perpetuity of the Union.

The governors have been invited to meet the mining, coal and oil operators at the American Mining Congress, at Los Angeles, Sept. 26 to Oct. 1, for the purpose of framing a western conservation policy in national legislation.

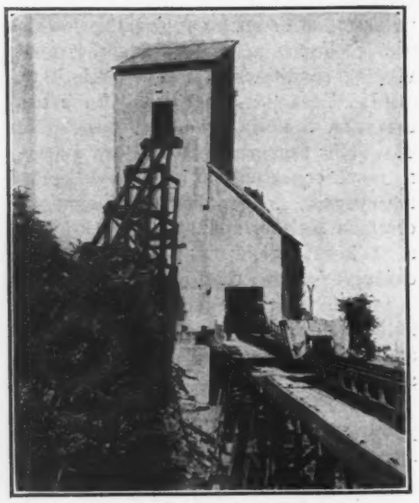
The gold production from lode mining in Alaska in 1909, according to a press bulletin of the U. S. Geological Survey, amounted to $4,107,363, this figure including the gold derived from copper ores.

DETAILS of PRACTICAL MINING

Notes of Interest to Prospectors and Operators of Small as Well as Large Mines. Things That Have to Be Done in Everyday Mining

Automatic Railways at the Cheever Mine, New York

The Cheever Iron Ore Company, at Port Henry, N. Y., has installed two lines of Hunt automatic railways to carry the ore from the headframe storage bins to the bins at the magnetic-separating mill. The installation of these railways, because of the grade required, necessitated the construction of two new wooden headframes, built on large blocks of monolithic concrete. Each bin has a storage capacity of over 300 tons. The Weldon headframe is 200 ft. from the mill and the trestled railway over the uneven topography has a grade approximating 3 per cent. A grade of 1¼ per cent. is given on the scales platform, in the next 20 ft. the drop is 18 in. while the grade diminishes from this point to the last 60 ft. which is level. The Tunnel-pit headframe is about 300 ft. from the mill storage and the trestle work is given a fall of about 9 feet.



AUTOMATIC TRAMWAY FROM WELDON SHAFT

Wooden cars with plate lining, having 2 tons capacity, and of the Hunt type, are used. Two men operate both automatic systems. After drawing off the storage from one bin they unload from the other storage. The car is loaded at the headframes and weighed on a 50-ton Fairbanks track scale. The weighing platform is 6x24 ft., so that ore may be drawn from any one of the three chutes opened by gates operated by air hoists.

The loaded car on being released runs down the track, striking a bunting stick which slides on the rails and which is attached to an endless cable traveling in the center line of the tracks. The momentum of the car moves the bunting block to a point over the mill bin and near one of the cable sheaves, where the sides of the car are mechanically opened and the contents discharged. The bunting block absorbs the energy of the car in lifting a triangle counterweight. As the counterweight falls it gives the empty car sufficient start up the incline to return the car to the headframe storage bins.

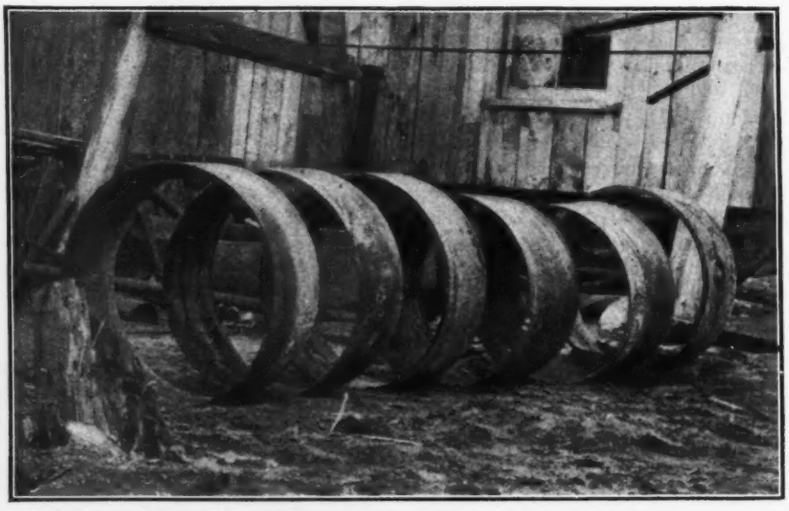
On the Weldon system a round trip is made in 30 sec., while 45 sec. are consumed in locking the car gates, loading, and releasing the car. On the Tunnel-pit system, the round trip is made in 45 sec. and the same time is consumed in loading. At this rate the two railways would handle about 5000 tons per day of two 10-hour shifts, and permit one and one-half hours delay during the 20 hours' work. If worked to this capacity the tramming costs on crude ore from headframes to mill would be less than ¼c. per ton. This includes labor, maintenance and allows for approximate charge per ton for installation.

"Mud Paint" from San Francisco Bay

The mud dredged from the bottom of San Francisco bay by the State Harbor Commission is soft, sticky, blue-black material and is almost like a paint. It costs the harbor commission 10c. per cu.yd. to dig and dump this mud into the deep waters of the bay. In the oil industry some good material has been needed to seal oil wells, line oil reservoirs, etc., and it is found that this bay mud is suited to this purpose. The mud is being taken from the slips and shipped to the oilfields where it is being sold at $120 per carload. The demand has exceeded the supply and the harbor commissioners have now placed a price of 25c. per cu.yd. on it.

Steel Roll Shells

The accompanying illustration shows six worn roll shells that were discarded after over ten months' continuous service at the Cobalt Central mill at Cobalt, Ont. These shells were made by the Chrome Steel Works of Adamantine steel 3⅜ in. thick and, as shown in the photograph, wore so evenly that they could be used until only ½ in. thick. This is an unusually good record and the fact that all six shells wore equally well testifies to the uniformity and excellence of the material used in their construction.



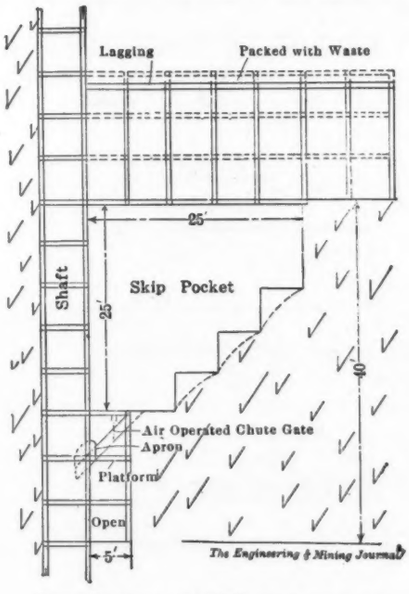
STEEL ROLL SHELLS WORN TO ½-IN. THICKNESS AT THE COBALT CENTRAL MILL

Custom treatment plants operated by the government of Western Australia (*Min. Journ.*, June 25, 1910) are proving a great boon to the operators of small mines. The only objection seems to be that an opportunity is afforded to get quick returns from high-grade ores, after which the mines are in many cases abandoned.

Skip Pocket and Station at Leonard Mine, Butte

The accompanying sketch shows the general idea of the arrangement and timbering of the skip pocket and station, on the 1800-ft. level, in the No. 2 shaft of the Leonard mine, at Butte, Mont. The excavation for the skip pocket is started at a point, five timber sets (25 ft.) from the shaft. It is carried straight down for two sets and then benched in three 5-ft. steps, the bottom being two sets wide. From the bottom of the pocket the excavation is carried down the width of the shaft for three sets.

A sheet-steel gate operated by a compressed-air cylinder controls the discharge of ore from the pocket into an apron, also of sheet steel. The lip of this apron, when turned down, extends over the edge of the skip so that the ore is run directly into the latter. The lip of the apron is



SKIP POCKET AT 1800-FT. LEVEL OF LEONARD MINE, BUTTE, MONT.

raised and lowered by compressed air. To operate the gate and apron, a man stands on a platform on the second set of the compartment beside the shaft.

TIMBERING OF STATION

The level station is first timbered with square sets, as shown by the dotted lines in the sketch. Two 8x10-in. stringers are then run out under the top caps for three sets, one end of each stringer being blocked up from the shaft-wall plate, the other from a cap of the third set from the shaft. Support is thus given to the roof of the station, while the first two sets of square-set timber are removed and replaced by the permanent station sets. Stringers are then blocked up in a similar manner, to span the next two sets, timbers removed and replaced, etc.

The posts of the station sets are 13 ft. long, made of 14x14-in. timber, 12x14-in. material being used for the caps. The space, usually a couple of feet high, above the station timbering, is filled in with waste; 3-in. lagging is used over the top and sides of the station sets.

A one-inch space is left between pieces of lagging to allow a free circulation of air and thus check rotting of the timbers. A station may be carried back as far as is necessary to provide ample room for handling cars. Beginning with the fourth set from the shaft, the bottom of the station should be raised ¼ in. per set to give the necessary grade to the approach. The station at the Leonard mine is 21½ ft. wide and provided with a double-track approach.

Extraction of Iron from Ore and Pulp*

BY W. C. BROWN

The following details and sketches show a machine I have designed to remove iron from stamp-mill pulp.

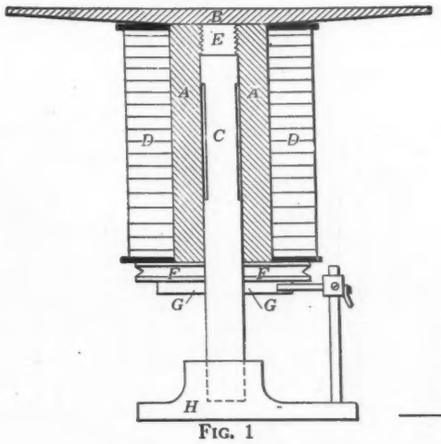


FIG. 1

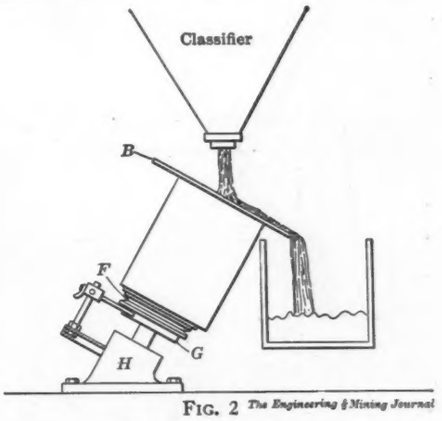


FIG. 2

BROWN ELECTROMAGNET FOR REMOVING IRON PARTICLES FROM PULP

CONSTRUCTION

In Fig. 1 *A* is a cast-iron core, 10¼ in. long by 6 in. diameter, with hollow in center 2 in. diameter. *B* is a circular pole, face 20 in. diameter, turned perfectly flat on top, the under side being tapered gradually from the edge, which is ¼ in. thick to the top of the core, where it is ½ in. thick. It is secured to the core by four ½-in. countersunk screws.

The exciting coil *D* consists of 5120 turns of No. 18 copper wire, wound on a bobbin made of sheet iron with brass flanges. The whole is made water tight with a zinc covering soldered to the iron bobbin. One end of the coil is grounded, and the other end brought out to a slip ring *G*. Between the slip ring and core a fiber insulator *F* is placed, to which the slip ring is secured. The insulator *F* is grooved as shown, so that it can be used as a pulley to revolve the magnet. In the top of the core a brass plug *E* is screwed. This serves as a bearing, and the whole is revolved on the spindle *C*, which is secured in a cast-iron foot *H*. The exciting current of this magnet is 2½ amp. at 100 volts, direct current being used.

The magnet revolves at six r.p.m. and is driven through a worm gear by a ½-h.p. motor. A ⅜-in. cotton rope passes over the pulley *F* and over a grooved pulley on the worm gear, a suitable tightener being fitted to take up the slack.

METHOD OF OPERATION

Fig. 2 shows the position of the magnet in relation to the classifier under which it is placed. The pole plate is at an angle of 35 deg. The pulp falls on the center of the plate and flows in a widening stream to the bottom edge. The iron particles are all caught on the edge of the plate and scraped off by a piece of canvas belting.

No iron of any size passes the magnet, and only the very finest is lost. This is due to the fine iron not being able to come in contact with the plate and is carried away by the heavy pulp.

*Excerpts from an article in *Trans.* So. Afr. Inst. Elec. Engrs., May, 1910.

Precautions for Handling Caps and Fuse

The following compilation of "Don'ts" to be observed in the handling of blasting caps, electric fuse and safety fuse should be interesting to mining operators. Possibly misfires would be minimized and accidents prevented by posting copies of the list of "Don'ts" where workmen will observe them. It is a well known fact that a great many of the accidents about mines are directly traceable to the careless handling of caps; electric fuses should be handled just as carefully. The precautions as set forth in the advance sheets of the new catalog of the E. I. du Pont de Nemours Powder Company are:

Don't carry blasting caps or electric fuses in your pocket.

Don't tap or otherwise investigate a cap or electric fuse.

Don't attempt to abstract caps from the box by inserting a wire nail or other sharp instrument.

Don't try to withdraw the wires from an electric fuse.

Don't fasten a cap to the fuse by biting it or flattening it with a knife. Use a cap crimper.

Don't keep electric fuses, blasting machines or caps in a damp place.

Don't attempt to use electric fuses with the regular insulation in wet work.

Don't worry along with old, broken leading or connecting wire. A new supply won't cost much and will pay for itself many times over.

Don't handle fuse carelessly in cold weather, for when cold it is stiff and breaks easily.

Don't store or transport caps or electric fuses with high explosives.

Don't store fuse in a hot place as this may dry it out so that uncoiling will break it.

Don't lace fuse through dynamite cartridges. This practice is frequently responsible for the burning of the charge.

Don't operate blasting machines half-heartedly. They are built to be operated with full force. They must be kept clean and dry.

Don't allow priming (the placing of the fuse and cap or the electric fuse in the high-explosive cartridge) to be done in the thawing house.

Don't cut fuse short to save time. It is a dangerous economy.

Car Stopping Devices on Gravity Inclines

It is of great importance to have, at the upper end of every gravity plane, a device to regulate the admission of cars, one at a time, to the plane, and at the same time protect the men working at the bottom. Figs. 1 to 4 illustrate three different types of appliances used in Germany to accomplish this.

The device shown in Fig. 1 consists of a pair of stops, one at the extreme top and the other a distance of 2 m. down the incline; both are raised into effective position by cams keyed to axles which lie underneath and across the track. The movement of the axles is controlled by levers connected in such a way that a single motion of the hand lever will raise one stop into position and simultaneously drop the other out of position. The first motion of the hand lever drops the upper stop, permitting the car to start down the incline. The car is blocked by the second stop, until a motion in the opposite direction lowers this stop, allowing the car to pass down the incline, and raises the upper stop into position to retain the next following car.

The apparatus shown in Fig. 2 consists of an axle about 1 m. long, lying below and parallel to the rails, and supported in this position by two journal boxes. To each end of the axle is fastened an arm, at 90 deg. to one another, of such length that the extreme end of each arm will reach out and rest upon the top of the adjacent rail, thus forming an obstruction to the wheels of the cars. When one rail is blocked, the other is free, so that to permit the cars to pass one at a time it is only necessary to rotate the axle through a few degrees alternately to one side and the other. The top tender does this with his foot.

The type of which two views are shown in Figs. 3 and 4 consists of a heavy, square beam pivoted at its ends and extending across the top of the incline at a sufficient hight to permit the loaded cars to pass beneath it. At one end of the beam is a single-notched ratchet engaging a pawl, which prevents the former from rotating beyond a certain point. Two strong arms are fastened to the square beam in such a way as to block the passing of a car on either track so long as the pawl holds. The latter can be released by pulling the handle on the end of the cord, which is within reach of the top tender, allowing the car to pass. As soon as it has gone far enough, the arms fall back into their first position, and their impetus carries the notch in the ratchet to within reach of the pawl, when the device is ready for the next car. It is apparent that the apparatus interposes no obstruction to the passing of a car coming up hill.

The danger to be apprehended in the device last described is that, if two cars should follow one another closely, in passing over the knuckle, by the time the first car had gone far enough to release the restraining arm, the second car would be so far advanced as to prevent the ratchet from establishing connection with the pawl, and the second car would race the first one down the hill.

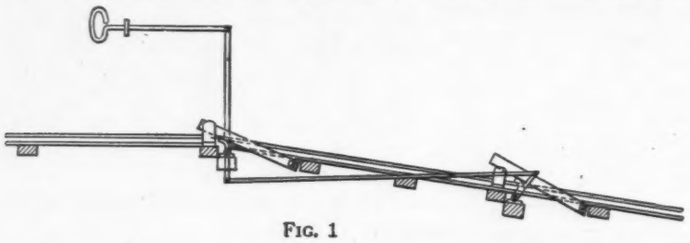


FIG. 1

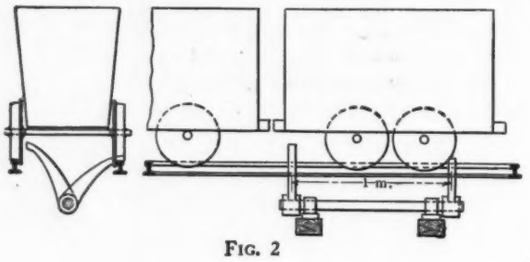


FIG. 2

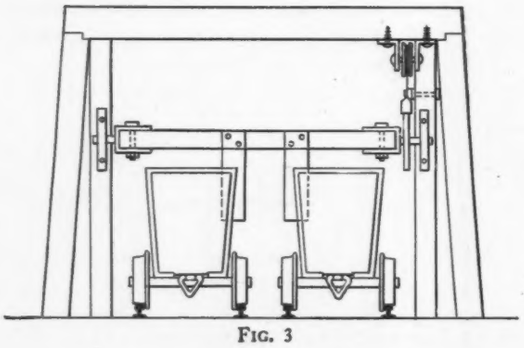


FIG. 3

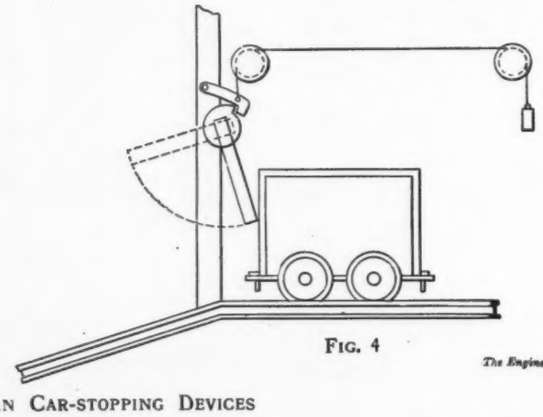


FIG. 4

The Engineering & Mining Journal

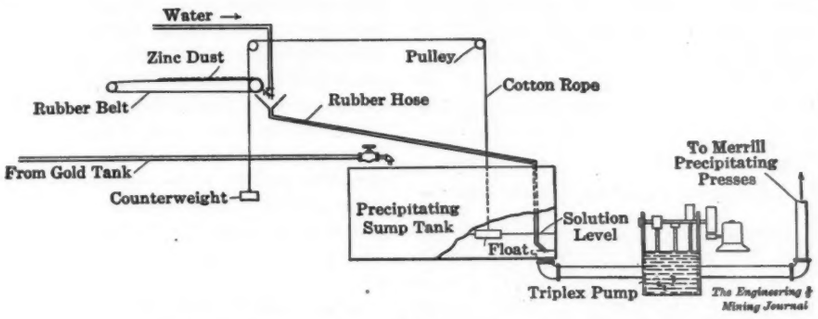
SOME GERMAN CAR-STOPPING DEVICES

Zinc Dust Feeder

BY A. B. PARSONS*

The accompanying sketch illustrates the simple but satisfactory method in use at the Goldfield Consolidated mill and a number of other Western cyanide plants for the zinc-dust precipitation of cyanide solutions. In the Consolidated mill there are three precipitating sump tanks, one for strong and two for weak solution. By simply changing valves the zinc dust can be switched to any of the three tanks, solution being run into the others while the contents of one are being pumped through the presses.

In each tank there is a float, attached to which is a cord that passes, as shown in the sketch, about the pulley that advances the rubber belt carrying the dust. The belt is thus advanced as the level of the solution lowers in the tank and at a rate depending upon the adjustment made. The number of tons per inch of solution in the tank, or what is the same thing, per equivalent length of belt, is known and the desired amount of zinc



ZINC-DUST FEEDING AND PRECIPITATING ARRANGEMENT

per ton of solution is spread along the belt.

Fresh water mixes with the zinc in a funnel-like arrangement and flushes it through a rubber hose to the intake of the main precipitating line for the particular tank being pumped. Two triplex pumps are used to pump the solution to the Merrill presses in the refinery at the upper end of the mill. The precipitation is largely effected during passage through about 400 ft. of pipe. Not only does the device require little attention, but it assures an exceptionally uniform introduction of the dust in exactly the required quantity.

In the Montana-Tonopah mill at Tonopah, Nev., where the same method of introducing zinc dust is employed, it has been found advisable to introduce compressed air along with water in the funnel into which the belt discharges the dust. A better emulsion of the dust is thus obtained and more complete precipitation assisted thereby.

*Goldfield, Nev.

The accompanying drawing only indicates the arrangement of the cone in which the zinc dust is emulsified. A ¾-in. water line is turned down into the cone, terminating close to its bottom. The outlet pipe from the cone connects to the precipitating-pipe inlet. It is a 1-in. line and is provided with a valve at a point between the cone and where connection is made to the fresh-water system. This water pipe is also controlled by a valve. The fresh water is only used to flush out the system.

Covering Galvanized Iron with Lead

To coat iron with a covering of lead which will be in absolute metallic contact is a difficult operation. Valves and small fittings made of iron well galvanized on the exterior may be homogeneously covered with lead in the workshop by any mechanic.

The method consists in immersing the piece to be coated in water to which a few drops of sulphuric acid have been added. Then while in the acid water the piece is readily amalgamated in the usual way by squeezing mercury through close-woven cloth all over its surface and thoroughly rubbing it in. The excess mercury is rubbed off and the piece carefully dried without heat, and then immersed in a bath of lead which should be well above its melting point, so that it would not tend to solidify by introduction of the cold piece. The casting may be withdrawn after about 20 seconds and will be found to be homogeneously covered with lead.

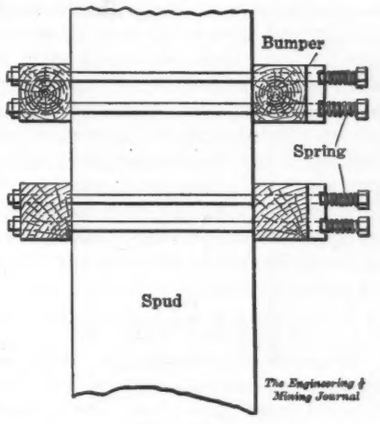
This method requires the piece to be galvanized before applying the lead and the galvanizing must be in good condition, otherwise the subsequent amalgamation will be imperfect.

On account of the mercury fumes gives off, it is not an operation one would wish to carry out day in and day out, and on large pieces, but the method is simple and, of course, can be applied to any metal or alloy that can be amalgamated.

Shock Arrester on Dredges

On some of the boats of the Yuba Consolidated Goldfields, operating near Hammonton, Cal., shock arresters are used to take up the jar from the spud. There is an enormous strain on the spud of a dredge when it is digging in hard or deep ground. When the bucket lines become suddenly stopped on account of encountering a boulder, etc., the shock is at once transmitted to the spud and thence, of course to the hull of the boat.

To eliminate this shock, insofar as possible, springs from standard car trucks are placed against a bumper, usually a tie, that is fixed outside, or astern, of the spud. The springs are bolted through the spud casing and similar cross timbers on the other side of the spud. The stock of the springs is 1½ in., they are 7½ in. in diameter and 9 in. long, there being two coils one fitting inside of the other. Two springs are used on each frame and four frames on each spud.



CAR SPRINGS ARRANGED AS SHOCK ABSORBERS IN DREDGE

When a heavy shock comes upon the spud, instead of being transmitted directly to the frame of the boat through the bumper, it is taken up in large measure by the springs, the bumper being held in place by the rods that connect the springs to the main spud casing. This saves the hull of the boat from a considerable amount of shock, and hence tends to lengthen its life materially.

Since the Cobalt Hydraulic Company installed valves to control the amount of air supplied to each consumer, a material increase in the pressure has taken place. The total load had risen from 2000 cu.ft. per minute to practically double that amount, while only a few more drills had been added. This was due to the fact that many of the mines were wasting air and using a much greater amount than their contract called for.

Mining Legislation in Queensland, Australia

Mount Morgan Gold Mining Company Exchanged Freehold Grants for Government Leases. Privileges Granted in Return for Railroad Building

BY A. C. VEATCH*

If someone should suggest that a powerful gold-mining company in the United States, owning the freehold of a property which was paying from $1,500,000 to $5,500,000 per year in dividends, had on its own initiative taxed itself for the benefit of the Government 25c. on every ounce of gold it extracted, what would you say about it? This is exactly what has happened in Queensland.

In 1864 a tract of low-grade grazing land was purchased from the Government and a deed of grant was issued containing no reservations and as fully conveying the minerals as a Government patent would in the United States. In 1882 the Morgan brothers discovered gold on this land and bought the 640 acres in the original tract from the first purchaser. In 1894 an act was passed by the Queensland Parliament, at the request of the Mt. Morgan Gold Mining Company, permitting this company to surrender its land and take out government gold-mining leases. The company has since that time paid 1s. per oz. on all gold extracted.

Common Law Rights

The cause of this singular action lies in the common-law right of the Government to all gold in all lands, except when it has been specifically conveyed to the freeholder. Only a few of the early deeds of grant in Australia contained a reservation of gold and silver, and about 1840, or before any land was sold in Queensland, the policy of inserting any reservations was abandoned.

It was officially announced on several occasions that all grants would convey all minerals and the people of Australia had the same reason for thinking that they owned the gold in the land to which they had title as the people in the United States have today. After the discovery of gold the government in New South Wales and Victoria asserted that under the common law it owned the gold in all land whether alienated or not, and if alienated wheresoever situated. This matter was fought out in the courts of Victoria and finally went on appeal to the court of last resort under the English law, the Privy Council. This body, in 1877, decided that a grant does not convey gold and silver "unless the intention that such minerals should pass is expressly stated in apt and precise words."

*Geologist, U. S. Geological Survey, Washington, D. C.

Although this doctrine had never been enforced in Queensland, the great value of Mt. Morgan led to several attempts on the part of schemers and promoters to wrest the title from those who had purchased the land. The suits which they brought were based on the sole contention that under the common law the freeholder had no right to the gold. These suits were successively dismissed on the basis that as the claimants could not show a better title than the company in possession, there was no justice in transferring the title, and that whatever may or may not have been the right of the freeholder to mine the gold, the contestants clearly had no rights at all. Had the government instituted suit, through the attorney general, the common-law right of the government would have been involved and the result would have been different, but the government remained quiescent and the company continued to develop the gold. Up to the close of 1893 this mine produced gold to the value of £4,725,386, and paid dividends amounting to £3,350,000.

Mineral Lands Act Amendment

Recognizing the enormous value and long life of the property, the company began to fear that if a radical government came into power it might enforce the common-law right of the state, claim all the gold in the land, and demand an accounting from the company for the gold already extracted. Accordingly, there appeared in the Mineral Lands Act amendment of 1894 clauses introduced at the request of the Mt. Morgan company, which gave to any freeholder the right to surrender his land to the government and upon such surrender to receive in lieu therefor a grant specifically reserving to the government all gold and silver. The owner of such surrendered land was given the preference right to make within 30 days after such surrender an application for a gold-mining lease covering the land involved. The Mt. Morgan company immediately surrendered the 75 acres of its freehold, which contained the deposits they were then working, received therefor freehold patents with the above reservations, and three government gold leases of 25 acres each, and has since paid a royalty on all gold extracted. This royalty now exceeds $30,000 per year.

In Queensland today owners may either follow the example of the Mt. Morgan company, or mine the gold on their own responsibility, as in the United States. It is, however, more than probable that within the next few years Queensland will assert its right in this respect and provide for mining on private property along the lines followed in the Western Australia mining law. Such provisions are made in the mining bill now before Parliament and meet the approval of the great majority of people in Queensland.

It might be pertinent to inquire in this connection: Would such a powerful company in the United States endeavor to protect itself in this way, or would it conclude that it was better "business" to buy a dispensation from the legislature transferring the right of the State to the corporation?

Perhaps the choice in this matter in Queensland did not lie as fully with the corporation as it has in some instances in the United States. Perhaps the people's representatives would have been willing to use their wits to see that the state was protected, and would have permitted no "grab" in this Queensland case even had the company attempted it. The ability and willingness of the legislators of Queensland to see that the government does not receive the worst of a bargain is well illustrated in several recent enactments.

Under the mining law no man can hold a mining lease without actual development, and no person can work as one property an area exceeding 50 acres for gold, 160 acres for minerals other than gold, and 320 acres for coal. In the early days the condition of development was naturally expressed as the continuous labor of a specified number of men. As larger work was undertaken the capitalists claimed with some show of justice that the amount of money expended was under certain conditions a fairer gage of a company's good faith than the mere employment of a given number of men, and demanded the expression of the development conditions in money per acre per year instead of men per acre per year. Capitalists have also demanded larger areas for special undertakings. Their demands in these respects have not yet been generally granted, but Queensland has on several occasions recognized by special enactments the principles that capitalists could prove their honest intention of developing in other ways than by actually employing men on the ground leased, and that occasions may arise where larger areas should be granted.

Special Enactments

In 1897 the Queensland Parliament passed the Chillagoe Railroad Act, which authorized the issuance of leases for 50 years for the lead, copper, and tin in areas not exceeding in the aggregate 2000 acres in the vicinity of Chillagoe. An annual payment of £1 per acre, or double the usual rental, was charged and the leases were granted on condition that the leasing company construct within four years a railroad 100 miles long which would be subject to government control and might be purchased by the government at the end of the 50 years. In return for this proof of the company's good intention and for the additional rental charge the government agreed to waive the usual development conditions on the areas leased.

In 1900 an act was passed empowering the government to grant to the Callide Coal Company 50 year leases to an area aggregating 2560 acres, on condition that it construct within four years a railroad 75 miles long, which road was to be subject to government control and might be purchased by the government on the expiration of the leases. In this case the one concession to the company was that it would be relieved of the development conditions on the areas leased until the completion of the railroad, but no longer. It was provided that in all other respects the leases should be subject to the usual covenants of rent, royalty and labor conditions. In this case the company was required to deposit with the government a sum of £2500 to be forfeited, together with all rights to the leases, if it did not complete the railroad in a specified time.

The Albert River, Burketown Lilydale Tramway Act and the Glasfield Tramway Act of 1900, and the Cloncurry Act of 1901, granted mineral leases under conditions similar to those already detailed. These enactments are the nearest approach, in Queensland, to the railroad-land grants made by the United States in the same stage of its development.

Taxation of Patented Claims in Arizona

The Arizona board of equalization put the rate of taxation for nonproducing patented mines in all counties at $35.40 per acre. This resulted in increases in some counties, from $6.74 in Cochise, for instance, and reductions in others, as from $50.02 per acre in Gila. This figure of $35.40 does not decrease aggregate valuation which amounts to $2,556,287.33. The acreage of nonproducing patented mines in the territory is 72,211,502. The total value returned was $2,348,097. The greatest acreage is in Yavapai with 27,391,340. In Cochise there are 16,018,215 acres.

California Oilfields

Los Angeles Correspondence

The price of oil and the fear of overproduction are matters of secondary importance to the operators in the California fields. The attention of everyone interested in the industry in the State is now focused on the laws governing the location of Government oil lands. Furthermore, there are grave fears that the next Congress will enact laws that will result in still greater hardships. Predictions are freely made that unless there is some change for the better the industry in California will receive a blow which it will take years to recover. While agents of the Interior Department are in the field investigating conditions and examining into the rights of various claimants, the operators have been holding meetings to discuss the situation with a view to finding some solution to the vexing problem.

Discussion of Location Laws

The needs of those individuals and companies prospecting on Government land are of course at variance with those of operators on land that has gone to patent. Obviously, the remedies suggested for the cure of existing evils have been numerous and in some cases directly opposed to each other. The subject will be discussed at the forthcoming meeting of the American Mining Congress, to be held at Los Angeles Sept. 26. Gifford Pinchot, after a visit through the oilfields, will be on the program to discuss conservation and its effect on the oil industry. It is the object of the operators to present at this meeting some plan whereby the proper legislation may be obtained. The operators, while approving conservation and deploring the needless waste of oil, believe that it is possible to formulate a law that will recognize the principles of conservation and at the same time allow of the proper development of the oilfields.

Several meetings have been held at Los Angeles and another one that it is hoped will be representative of operators from all sections, has been called for Aug. 25. A meeting has been called also at Bakersfield for Sept. 4 to discuss the subject and devise means for relief. It is to be hoped that these meetings will result in concerted action, for under the present laws the oil industry will suffer, and many who have spent money in good faith and will be forced to abandon their investments.

Union Oil Company Operations

Following is the present production of the Union Oil Company of California, the first figures representing the number of wells in operation and the second the output in barrels per day: Maricopa-Sunset field, 30, 30,000; Coalinga, 20, 2500; Los Angeles, 4, 500; Fullerton, 40, 4000; Ventura, 115, 500; Lonpoc, 18, 2500; Santa Maria, 90, 12,000; total, 317 wells in operation with a total output of 52,000 bbl. per day. This is an average of about 164 bbl. per well; leaving out the Lakeview gusher, which is now figured at 20,000 bbl., the average is about 101 bbl. per day. The Lakeview gusher, up to three weeks ago, made no water, but at that time a fraction of one per cent. was noted, and this has now increased to between 5 and 10 per cent.

Prospecting Curtailed

The Union company has 60 strings of tools in the various fields, but on the large production of oil only 35 strings are in use. The deepest well in the State, the Brashear No. 1 of the Union company, about 5 miles west of the city of Los Angeles, has just been abandoned and the rigging shipped to the Fullerton field. Here a well will be started on the Baster-Chury lease and it is expected that it will be drilled to a depth of 4500 ft. The Brashear No. 1 is 5665 ft. deep and holds a world's record in having been drilled with only four strings of casing. Ten-inch casing was carried to a depth of 2902 ft.; 8¼-in. to 3956 ft.; 6⅝-in. 5355 ft., and 4½-in. to 5665 ft. In abandoning this well the entire string of 4½-in. casing was pulled with the elevators and without the use of a spear. The well was started in March, 1907, and never gave any indication of being a successful producer. The Union Oil Company of California is spending about $100,000 per month in the various fields of the State.

Johnnie Mining and Milling Company

T. A. Johnson, general manager of the Johnnie Mining and Milling Company at Johnnie, Nev., writes that the milling plant of this company consists of 16 Nissen stamps which treat 70 tons of ore per day, and a Lane slow-speed chilean mill with a capacity of 30 tons per day. The ore runs $4 to $10 per ton. Fairbanks-Morse gasolene engines—80 and 100 h.p.—furnish the power. Eight Sullivan drills and six Waugh stopers are used; also one large 3¼-in. Sullivan drill is used in sinking and drifting. The shaft has been sunk from the 700- to the 800-ft. level within the last month, and sinking is now in progress to the 900. The company owns 12 claims and three water rights, together with a 4-in. pipe line 2¼ miles in length connecting the water with the camp and another 2½-in. pipe line 4½ miles in length connecting the spring with the company's townsite. The ore treated is free milling and a saving of about 90 per cent. is the general average.

Vogelstruis Consolidated Deep, Roodepoort

LONDON CORRESPONDENCE

A recent dispatch from the board of directors of the Vogelstruis Consolidated Deep states that owing to the continuous low-grade character of the ore, the mill has been shut down, but that development work would proceed if the shareholders subscribed the necessary funds.

There was a reorganization of this company in 1905, and another in 1908. About the middle of 1906, the financial resources were so reduced that work was stopped. On Dec. 3, 1906, the ore reserves were reported to be 74,440 tons, having an average gold content of 8.63 dwt. and this represented 76 per cent. of the ore developed. On the strength of this condition, work was resumed in 1908. The consulting engineer had advised them to resume operations and erect a reduction plant.

NARROW REEF

This mine is situated in the Roodepoort district of the Witwatersrand, where the reefs are rich but narrow. Before the outbreak of the Boer war the reef was encountered in two of the shafts, but was found to have a low metal content when compared with neighboring reefs. The reef was also encountered in the third shaft, previous to resumption of work in 1908. At the close of 1908 the ore reserves amounted to 91,923 tons of 8.94 dwt. ore, representing 72 per cent. of the total ore developed.

Of the ore developed during 1909, only about 2 per cent. represented profitable ore having a metal content of 6.95 dwt. These assay figures were calculated over a stoping width of 30 in.; the clean reef was only about 6 in. in width.

ORE RESERVES RECALCULATED UPON LOWER RECOVERY

After stoping and crushing for two or three months, it became evident that the ore reserves would have to be recalculated on the basis of a stoping width of 37 in. and a metal content of 5.75 dwt., as an extra 7 in. of width could not be prevented from being broken with the ore. It also developed that the metal content of the ore had been placed at too high a figure as proved both by subsequent sampling of the winzes and by actual stoping, although the chairman said those results had been checked and rechecked and all abnormally high assays had been reduced.

Thus, it was hardly surprising that the milling results were disappointing, though up to the time that the mill was started, the ore reserves were stated to have a gold content of 8 dwt. It also appears that the ore had not been opened up sufficiently for proper mining, as gleaned from this cable despatch: "The milling of these reserves, (37 in. averaging 5.75 dwt.) should yield profit, provided the plant was supplied to full capacity, which, owing to the limited amount of stope faces is, however, not possible."

Too much stress should not be laid upon this condition of the Vogelstruis Consolidated Deep, as it cannot in any sense be taken as representative of the mines upon the Rand, but its failure emphasizes again the fact that there are reefs in the Rand which, under present conditions, are too poor to work. It may be said, however, that the public is just as slow to see the worthlessness of some concerns as it is to grasp the possibilities of those properties in which the mines are of proved worth.

Metal Output of Ontario

The accompanying tabulation, made from returns to the Bureau of Mines, shows the output of the metalliferous mines and works of Ontario for the six months ended June 30, 1910.

METAL PRODUCTION OF ONTARIO FOR FIRST SIX MONTHS, 1910.

	Ounces.	Value.
Silver	12,804,992	$6,260,197
	Tons.	
Cobalt[1]	189	35,657
Copper	4,634	660,497
Nickel	9,339	2,005,660
Iron ore	39,497	113,082
Pig iron	221,718	3,540,688
Zinc ore	576	5,000

[1]Includes only cobalt paid for.

The shipments from silver mines aggregated 14,787 tons, of which 12,024 tons were ore and 2763 tons concentrates. The former averaged 814 oz. of silver to the ton and the latter 1017 oz. Gowganda contributed 334 tons of ore containing 317,925 oz. of silver, and the Lake Superior district a small production, the remainder being from Cobalt. The production for the corresponding period of 1909 was 11,234,382 oz. of silver.

The nickel-copper mines of Sudbury yielded 9339 tons of nickel and 4634 tons of copper, as compared with 6027 and 3741 tons respectively for the same period last year, or 52 and 42 per cent. respectively. The production of pig iron as compared with the first six months of last year was 221,718 tons, having a value of $3,540,688, as against 211,583 tons for the corresponding period, last year.

The Arizona Copper Company, Limited

The semi-annual report of the Arizona Copper Company, Ltd., for the half-year ended March 31, 1910, showed net profits of £96,036 from copper, stores and rents, and net returns of £134,665 from the Arizona & New Mexico Railway. Dividends of £12,265 were paid on "A" preference shares and preference stock, leaving a surplus for the half-year of £122,400. Out of this sum the directors resolved to pay, July 30, 1910, an interim dividend for the year to Sept. 30, 1910, of 1s. 3d. per share, free of tax, on 1,519,896 ordinary shares of the company.

During the half-year 81,609 tons of copper ore, concentrates and other copper-bearing material were smelted, yielding 8161 tons of bessemer copper. The directors decided to enlarge the capacity of No. 6 concentrator, to sink a new shaft and extend the tunnel connection therewith. It is expected that this will enable lower-grade ore to be profitably worked.

Miami Stock Increase

An increase of 100,000 shares, or $500,000 has been authorized by stockholders of the Miami Copper Company, thereby enlarging the present capital of $3,500,000 to $4,000,000. Prior to the increase the 700,000-share capital, par $5, was held as follows: In hands of public, 603,347 shares; for bond conversion, 84,889 shares; unissued in treasury, 11,764 shares. President Lewisohn says that $1,000,000 is necessary to put the property in shape for economical production; 60,000 shares of the increase, underwritten by the General Development Company, offered for subscription at $18 to stockholders will yield $1,080,000. There will remain in the company's treasury 51,000 shares, which may be issued at option of the directors.

Copper Curtailment

Thompson, Towle & Co. figure the monthly rate of curtailment in American copper production as follows:

	Pounds.	Cause.
Butte	4,000,000	Curtailment
Lake Superior	1,500,000	Curtailment
Bisbee	2,000,000	Curtailment
Imperial Copper Co.	800,000	Shutdown
Utah Copper Co.	2,000,000	Curtailment
Nevada Cons.	1,000,000	Curtailment
First National	1,250,000	Shutdown
Mammoth	1,000,000	Smoke troubles
Cerro de Pasco	3,000,000	Shutdown
Bully Hill	500,000	Shutdown
Old Dominion	1,000,000	Curtailment
Sup. & Boston	200,000	.....
Greene-Cananea	1,000,000	Curtailment
Total	19,250,000	

The above estimate is illustrative, but probably is too high.

Correction

In publishing the reports of the Butte mines for 1909, in the JOURNAL, June 25, page 1314, the figures submitted for the Boston & Montana mines read, "Cost of mining, $4,263,538, and cost of marketing, $1,001,644." These should have read $4,763,583 and $1,011,644, respectively.

The Portland Canal Mining District, B. C.

The Portland Canal district of British Columbia has recently attracted the attention of mining men and many exaggerated reports regarding wonderful strikes have been circulated. It seems now, however, as if there be reason to believe that a productive mining field would be developed in the district.

The accompanying halftone is a view of the town of Stewart, which is situated at the head of the Portland canal, on the delta of Bear river. About two months ago there was an auction sale of lots (the law of the province provides that when a new town is platted on land obtained from the government, since the enactment of that law, the provincial government thereupon becomes entitled to one-fourth of such lots), the total proceeds from which sale being about $440,000. From the photograph an idea may be gained of the topographical nature of the region. Precipitous mountain sides are characteristic and greatly increase the difficulties of prospecting.

TOWN OF STEWART, PORTLAND CANAL DISTRICT, B. C.

NEW RAILROAD FOR DISTRICT

Early in August, D. D. Mann, vice-president of the Canadian Northern Railway, visited the district and is reported to have been favorably impressed with the prospects of the region becoming a steady producer of moderately low-grade gold ores, for the development of which large amounts of labor and capital will, however, be required. Mr. Mann is now engaged in the construction of the Portland Canal Short Line, a railway 15 miles in length which will facilitate the development of the mineral properties of the camp. His engineers state that the road will in all probability be in operation before the end of the present year.

DEVELOPMENT AND CONSTRUCTION WORK IN PROGRESS

The Portland Canal Mining Company was one of the first to operate in the district. It has done and is still doing considerable development work. The No. 1 tunnel on the property is reported as in to the main orebody. The No. 2 and No. 3 tunnels are in ore but not, it is believed, in the main shoot. A 45-deg. raise is being run to connect the No. 1 and No. 2 tunnels.

The flume across Glacier creek is finally completed and a crusher house and mill are in process of erection. The tramway is in good working shape and is estimated to have a carrying capacity of 400 tons per day, which is greatly in excess of the present output of the mine.

GEOLOGICAL REPORT ON BITTER CREEK STRIKE

The director of the Canadian geological survey has just received a report by E. G. McConnell on the recent discovery of gold on Bitter creek, Stewart, B. C. Mr. McConnell has been in the Portland Canal district since spring, making a geological survey of the district. He has just examined the new discovery at Bitter creek, concerning which exaggerated accounts have been circulated.

Mr. McConnell states that "the discovery was made on the precipitous sides of a mountain of slate or shales with occasional graywacke bands, seamed horizontally with numerous granite and diorite dikes, some of them 20 to 30 ft. thick. The slates dip at an angle of 40 deg. and are fairly regular. The ore occurs in zones following generally the dip and strike of the slates but cutting them in places at a low angle. The principal zone has a thickness, at the only place where it is accessible, of about 15 ft., and consists of silicified slate and quartz carrying more or less iron pyrites. In places layers of almost pure iron pyrites occur. A red zone at about the same elevation (600 ft. above the glacier), can be seen at intervals running horizontally along the mountains for a distance of about 3000 ft. It is interrupted by several rock slides and for the most of its course passes along inaccessible cliffs. The width of the zone ranges form five to about 20 feet.

ORE FROM $3 TO $8 PER TON

"Assays made here from specimens brought in by prospectors are reported to run from $3 to $8 in gold per ton. Some rich assays were obtained from oxidized float, but these, of course, do not mean much.

"Besides the main zone several other similar silicified zones, none traceable for any great distance, outcrop at various points on the mountain slope. The principal mineral in all of these is iron pyrites with occasionally a little chalcopyrite and at one point a small seam of galena.

"Vein matter in the mountains is abundant, but the valuable content, so far as known, is low, so low that it is still doubtful if it could be extracted at a profit. The ore occurrences are, however, promising enough to justify some expenditure in exploration. The mountain has not been thoroughly prospected, in fact, most of it could only be prospected with the aid of a balloon. Promising float is abundant in the slides and there is a good chance of finding richer shoots than any yet discovered.

"The transportation question, if pay ore in quantity is discovered, has its difficulties, but these could be overcome if the deposits prove valuable. The valley is filled with a glacier from half a mile to a mile in width, which extends down for three miles below the discoveries. Farther down, snow slides sweep both sides of the valley at a number of points. The grade on the three miles of glacier is 700 ft. to the mile, and on the lower six or seven to the Bear river forks, 100 ft. to the mile."

Mining and Stoping Methods in the Coeur D'Alene

Long Tunnel Entries Common. Vertical Ore Face Carried in Bunker Hill Stopes. Hecla Works One Large Stope. Shoveling in Snow Storm

JOHN TYSSOWSKI*

Practically all of the Cœur d'Alene mines are favorably situated for tunnel work, the hills being steep and high. The natural plan for working under such conditions is to tunnel at the lowest possible level and stope up. This was originally done in most cases, but now a great many of the mines have reached a point where shafts must be sunk. Another peculiarity of the district is, therefore, that shafts are sunk from the main adit tunnels and in many cases at points a mile or two back from the entries.

Large Stopes in Bunker Hill & Sullivan

The conditions prevailing in the lower levels of the Bunker Hill & Sullivan mine, at Wardner, Ida., are: Large orebodies with heavy and indeterminate hanging-walls (several stopes 300 to 700 ft. long, have an average width of 40 ft. and are carried up 200 ft. in a lift); a heavy galena ore for the most part of such grade that the entire mineralized zone can be profitably mined; a shattered-quartzite country rock. By the ordinary square-set methods, carrying a horizontal or stepped face of ore, such a large area would be exposed overhead that it would be practically impossible to hold stopes open. There would be constant danger from large blocks of the back sloughing off.

The stoping system adopted is necessarily quite elastic as conditions vary greatly. There is, however, a certain definite scheme to the mining, of which the methods used under the different conditions are simply necessary variations. The novel feature of the practice is in carrying a vertical face of ore in the stopes and in always keeping the hanging-wall supported with waste well up to the face of ore. The upper floor of a stope on the hanging-wall is then used as a distributing sublevel from which waste for filling is run into the stope.

The accompanying sketch, Fig. 1, shows an idealized section of a stope worked by this method, which was evolved by Stanly A. Easton, manager of the Bunker Hill & Sullivan Mining and Concentrating Company. The sill floor is crosscut and drifted so that electric trains may get about to draw ore from chutes. Then starting at the hanging-wall side, a section of convenient length, and three or four sets wide is broken out and carried up to the hanging. This space is filled from the hanging-wall to, or within a few feet of, the ore face, filling being confined by lagging of slab timber placed against square-set posts. Another cut, usually two sets wide, is then made, up the face to the hanging-wall. As a working face is usually best drilled and broken with uppers, the use of stoping, air-hammer drills is advantageous. This is one of the best features of this method of attack.

Waste Dropped into Stopes

The manner of attacking the face varies greatly, but the idea is to preserve

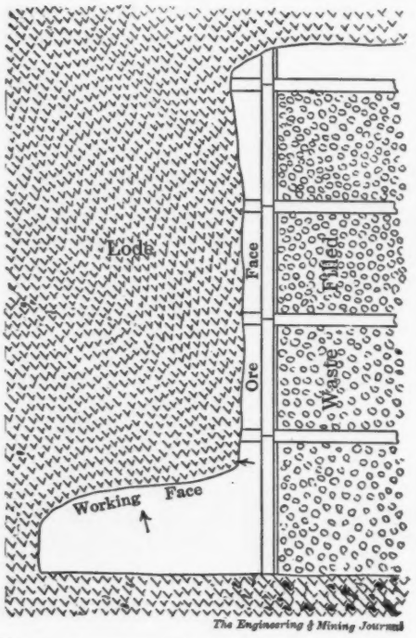


Fig. 1. Bunker Hill & Sullivan Stope with Vertical Ore Face

as near as conditions permit, a vertical face of ore throughout the stope, to maintain filling right up under the hanging-wall, and to use the top floor in the stope as a sub-level for the distribution of waste about the stope. Waste for filling is generally dropped into the stope through one hanging-wall raise to the level above so that the hanging-wall need not be further weakened by cutting into it for filling material. Every 15 or 20 ft., ore chutes discharge into the level below. Square sets lagged around with slabs are kept open and used as ore passes through the stopes. Where the orebody flattens out it is sometimes necessary to handle the ore several times in a stope before it finally reaches the haulage level. In such cases it is dropped until it reaches the foot-wall of the ore zone, drawn into 1½-ton cars and trammed through crosscuts to the hanging-wall and there again dropped through the ore passages, and so on until it finally is drawn out into 30-cu.ft. capacity cars of the electric trains serving the main level. Gangways from the foot- to hanging-wall must be left at proper intervals so that ore can be handled to chutes where necessary.

Another feature of the stope practice at the Bunker Hill & Sullivan is in keeping the work scattered so that the men do not interfere with each other. There is thus always plenty of open ground about which the men may be distributed for their work. As an illustration in one stope between the 9th and 10th levels work has been carried on for five years and it is estimated that it will still require a year and a half to work out this stope. Another stope, open for a length of 700 ft. and varying in width from 21 to 40 ft., is only called upon to supply 200 tons of ore a day, 26 men being worked on the day shift and only four employed on waste filling at night.

Bunker Hill & Sullivan Timber Costs

In the Bunker Hill stopes, square sets framed of local, red fir, stull timber are used. And on account of keeping so little open back above the working face it is possible to use timber a large proportion of which is under 8 in. diameter at the small end. This timber is cut off of the company's land and costs only 5½c. per linear foot delivered at the mine. This in part accounts for the low timber cost per ton of ore stoped. (The ordinary wage is $3 per day for muckers and $3.50 for miners.) Data supplied by Mr. Easton shows that for stoping concentrating ore, labor costs about $1.05 and supplies 38c. per ton of ore stoped. Of this total of $1.43, timber (stull and lagging) figures at nearly 20c. and labor on timbering slightly over 8c. These figures do not include development work, which cost $3000 during the period under consideration, when 40,000 tons of ore were stoped, increasing the cost about 7c. per ton.

Sorting Grizzlies in Last Chance

As a rule, the stopes in the Last Chance mine of the Federal Mining and Smelting Company, near Wardner, are smaller than those in the Bunker Hill & Sullivan. They can consequently be

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square set and worked by the ordinary stope methods. The special feature in work at the Last Chance is the close sorting that is done underground. Sorting grizzlies, such as described in the JOURNAL of June 11, page 1215, are used in places where it is not convenient to do much hand sorting. These grizzlies simply separate the fines, which are considered as ore. The large lumps are then quickly sorted by hand.

HECLA MINE WORKED IN ONE STOPE

The Hecla mine, at Burke, is peculiar in that one stope supplies practically the entire output of the mine at any one period. At the time of my visit, this stope from the 900- to the 600-ft. level was being worked on eight floors, from the 8th to the 16th, and supplied about 375 tons of mill ore, besides considerable first-class shipping product, per day. The orebody is nearly vertical and on the 900 level is developed for about 1300 ft. on the strike of the vein which ranges in width from 12 to 20 ft. The walls squeeze badly, so that the ore faces must be timbered closely and even then large caves occur. The various floors in the stope are advanced horizontally. The working face of the entire stope prevents the usual stepped form of the overhand stope. At the Hecla, 2½-in. Wood piston drills are in general use.

Stull caps are usually 22 to 24 in. in diameter and 12 ft. long. The posts are 9 ft. long and are placed on the walls and also where caps are butted to reach across the stope. Collar braces of 3x10-in. material are used, except where the stopes are wide, when poles V-notched at the ends, so as to wedge with pressure, are substituted.

The stope is provided with chutes at 30-ft. intervals. Three sets are left open at these points for ore and timber chutes and a manway. The section of the stope between chutes is lagged off with 3x12-in. material in 9-ft. lengths, and waste filled. Chutes are cribbed in wide portions of the stope.

SPECIAL TIMBERING FOR DRIFTS

Carrying a stope 300 ft. high, special means must be taken to support the enormous weight of the filling and keep the drift below it open. The entire sill floor is cut out and drifts maintained directly below the stope so that supporting the stope filling is a most important problem of the mining practice.

After the sill floor is cut out, it is timbered according to the ordinary method with round timber. The space between the first and second stope floors is left open to provide space for taking up pressure from the filling. Extra timbers are then put in the drift, the posts being long enough so that the heavy stringers which they support will just clear the caps of the primary set. A second set of timbers is supported on these stringers, the posts being again long enough to carry stringers that rest on the caps of the second tier of the primary set. Stulls wedged tightly against the walls cap both sets and upon these poles are laid lengthwise of the stope to form a floor to support the filling.

When necessary, either set of timbering may be renewed, as each is independent from the other in all members. In retimbering, posts are placed under stringers, and under the center of each cap of the primary set, which brings them 2½ ft. apart (sets are 5 ft.). The

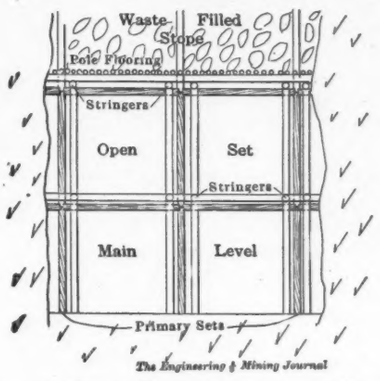


FIG. 2. DRIFT TIMBERING BELOW 300-FT. FILLED STOPE IN HECLA MINE

accompanying sketch, Fig. 2, shows how this supporting timbering is built up under a wide stope. It is seen that stringers are laid on the walls and on either side of the center posts of the first set. These stringers are usually 20 to 24 in. in diameter; the posts are 9 ft. long, and the caps usually 12 ft., but longer ones to reach entirely across the stope are used when available.

CONDITIONS AT THE SNOW STORM

At the Snow Storm mine, 1½ miles from Larson, an orebody averaging 25 to 75 ft. in width is mined for a distance of 800 ft. on the strike which is approximately N. 60 deg. W. The orebody dips 66 deg. to the southwest and occurs in the Revett quartzite, geologically the next younger series than the Burke formation, in which the silver-lead orebodies of the district are found. The mine is worked from a main entry tunnel, No. 3, the levels above being 900, 800, 700, 600, 400 or No. 2 tunnel. The No. 3 tunnel is about ⅓ mile long, and the new tunnel at a 550-ft. lower elevation had already been advanced 300 ft. at the time of my visit in April last.

The stope practice at the Snow Storm is to work the lode in blocks 150 ft. long on the strike, using square-set timbering and following with filling, usually to the third floor below that on which the men are at work. Chutes are put in every 30 ft. in each direction and are offset as they approach the hanging-wall, as is shown in Fig. 3. A drift 9x9 ft. in the clear is maintained on the sill floor near the foot-wall. When necessary, posts and blocks, put in as shown, are used to reinforce these sets, but by using angle braces and roughly flooring the second stope floor so that the weight of the filling is taken up by the angle braces in the first set above the drift, caps have to support little weight. Waste filling comes directly to the drift set but the sill floor is not cut out all the way to the hanging-wall, this rock being recovered from the next lower stope.

Timbers for square sets are framed as follows: Caps are 6 ft. long, double caps 12 ft., and are slabbed on the top and bottom to a thickness of 12 in., 1½-in. daps 9 in. wide being cut for girts and posts. Medium timber goes in posts which are 6 ft. long and framed on the end with a 9x9-in. horn 1½ in. long. Small timber makes girts, which if necessary are slabbed to 9x12 in. size. Slabs are used for corraling waste and 3-in. planks for flooring and lagging around ore chutes.

SHOVELING MINIMIZED IN STOPES

Stopes are open from the foot-wall, a three-compartment raise on the foot-wall being put through to the level above in advance of the stope. This raise comprises an ore chute, timber slide and manway. In the stopes the entire width of the vein is carried in both directions

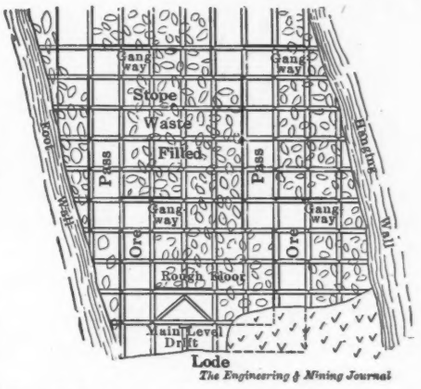


FIG. 3. IDEALIZED SECTION THROUGH STOPE IN SNOW STORM MINE

from the raise on each floor which usually follows about four sets behind the next lower one. Ore is dropped one set, sorted and dropped or shoveled into inclined wing chutes, built of 3-in. plank, that connect to the main ore passes. In wide places the incline chutes are built in all four directions, ordinarily only parallel to the strike of the lode. Using these inclined wing chutes little shoveling is required in the stopes and the mining cost consequently reduced. Filling is kept up to this third floor below the back. Waste for filling is gotten from sorting in the stopes and is also dropped from the next level above through raises that are put up when necessary. A long inclined raise in the foot-wall connects to a surface, waste, mill hole. When waste is dropped into the stope, small cars and tracks are put in on the distributing floor.

Air-hammer drills are used for all stoping work. All timber, tools, etc., are hoisted into the stope with small air hoists, situated on the main levels and operating through the timber slides at 150 ft. spacings. In putting up the first three-compartment raise a gin pole of 2½- and 3-in. pipe is used to hang the blocks upon so that the engine always hoists material to the elevation at which it is to be used. An idealized section of a Snow Storm stope is shown in Fig. 4.

Mace Mines Worked by Ordinary Overhand Stope Methods

The conditions at the Mace mines of the Federal company are similar to those at the Hecla. The stope practice differs, however, in the following points: Levels are cut at 200-ft. intervals, chutes put in every 40 ft. and timber chutes only every 80 ft.; only air-hammer drills are used in the stopes, the back being the working face. In both mines work progresses simultaneously on many stope floors.

Sill floors are also completely cut out at the Mace mines, but are bulkheaded or filled, leaving only space for the haulage drift. The first stope set is left open and single timbering is used. When the sets begin to crush they are taken up with long posts reaching all the way up to the second stope floor. These posts are replaced by shorter timbers as necessary. By this method drifts usually last out the life of the stope. Stopes are carried all the way up to the drifts above, the drift sets being caught up on extra sills and posts under which waste is filled up level to the drift floor.

Mining Costs

In general it may be said of the developed mines of the Cœur d'Alene that mining costs range from $1.75 to over $3 per ton of ore broken. The skill and ability of those in charge of operations largely determine costs, but another important factor must not be lost sight of. This is the extent to which underground sorting is employed. There are doubtless mines operating at a profit in the Cœur d'Alene under a mining cost that shows on paper at—say $3. Yet those same mines could not be profitably operated (other conditions remaining unchanged) with a $2 mining cost, the difference being from the amount of sorting done in the stopes and ore bin.

Underground Sorting an Important Factor

At each mine the extent to which sorting is profitable under the working conditions must be determined. As instances of this consider some of the typical mines of the district. Reports show that straight stoping costs in the Bunker Hill & Sullivan amount to about $1.45 per ton of ore broken. At the Wardner and Mace mines of the Federal Mining and Smelting Company the mines costs, including all charges except those of the construction account, figure close to $3 per ton, but at Wardner probably 50 per cent. of the rock broken is sorted out in the stopes and 40 per cent. at the Mace mines. And on the ore sorted and shipped as first class the company figures a saving of $6 to $12 per ton, depending on silver values, over that which would be realized by milling the ore. At Mace about 300 tons of first-class ore are now sorted out each month and 1100 tons were shipped some months before the old sorting plant was burned. At Wardner the company ships from 500 to 800 tons of first-class ore per month.

Timber Cost Variable

The cost of timbering varies with the nature of the ground. The cost of peeled, red fir, stull timber at the mines ranges from 5½c. per linear foot for timber under 8 in. in diameter at the small end, to 19¾c. for sticks under 20 in. As stated, the Bunker Hill reports show timber costs of only 28c. per ton, inclusive of labor for putting it in. This is, however, rather below the average cost in the district, which generally ranges from 40c. in fairly good ground to 75c. or 80c. where stopes are wide and walls poor. Even higher timber costs might be looked for when large timbers are required, and the ore is silicious and hence of lower specific gravity than the galena ore of the lead-silver mines.

The mining and stoping methods in some of the other mines of the Cœur d'Alene district are interesting, but not in any important way different from those of the typical examples which have been treated. Of the other developed mines where the methods are interesting might be mentioned the Hercules, and of the younger mines the Caledonia is a typical example. The latter is at present worked only to a depth of 500 ft. in the extremely rich oxidized zone. The mines of this type that are still in the development stage are not interesting from the view-point of a study of mining methods, as in most cases the idea at first is to get out the high grade and exploit the deposit. Later, when the operation of a mine is reduced to a commercial basis, the refinements of methods have to be instituted if the mine is to continue as a producer.

Electricity for Mexican Mines*

The mines in the Etzatlan and Hostotpaquillo district of Mexico will soon be supplied with all the electrical energy necessary for their operation. Machinery for generating 8000 h.p. has been delivered at the site of the Puente Grande hydroelectric plant on the Santiago river, near Guadalajara. This machinery was purchased from the contracting firm of Siemens-Schuckertwerke, of Berlin. Two complete 4000-h.p. units have been delivered, and another smaller unit will soon be received. The power house and penstock will be ready as soon as the turbines are set up. This plant is being erected by the German firm under contract with Manuel Cuesta Gallardo, a Mexican capitalist, who will construct a long transmission line which will supply energy for the mines and plantations of that district. When completed the entire property will become a part of the merger of interests of which the Guadalajara Railway, Light and Power Company is a principal feature. The merger will be known as the Chapala Hydroelectric and Irrigation Company. A line of steel towers has already been erected over the main transmission route, and side lines to various mines.

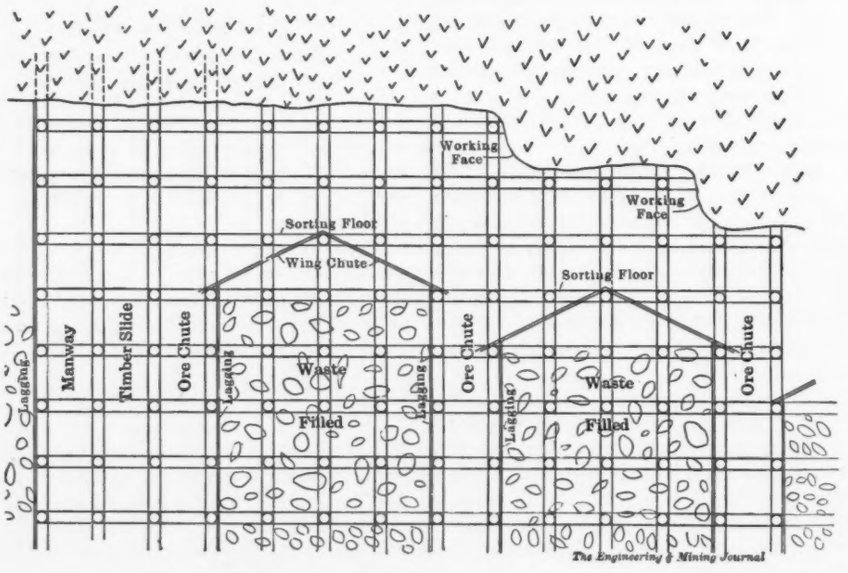


Fig. 4. Method of Placing Wing Chutes in Stope in Snow Storm Mine

*Elec. World, June 30, 1910.

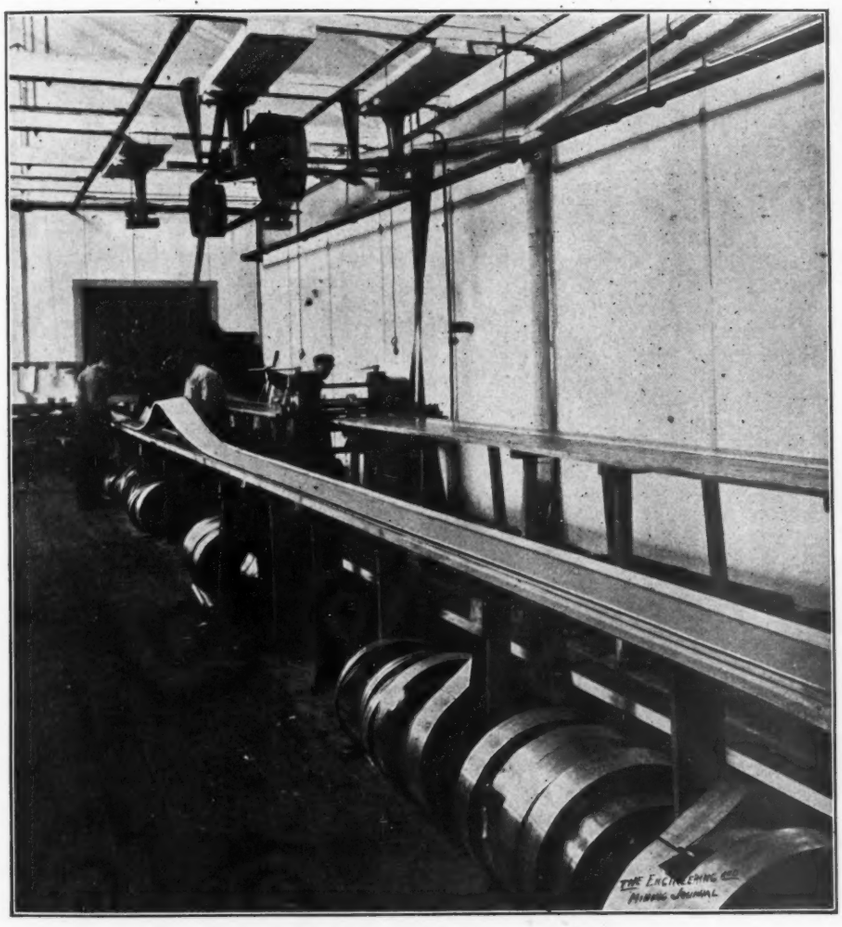
A New Steel Belt Conveyer in Use in Sweden

A Flexible Steel Ribbon the Distinguishing Characteristic of This Conveyer. Construction, Maintenance and Power Costs Are Low.

BY ALFRED GRADENWITZ*

The growing tendency in engineering to substitute mechanical devices for manual labor is also manifested in connection with the handling of materials. In fact, mechanical conveyers can hardly be dispensed with wherever there is to be regular transportation of material.

Although the construction of mechanical-transporting plants has become an engineering branch of its own, all the horizontal conveyers so far designed, in spite of their number, may be divided into two classes, namely: chain and belt conveyers. The former class comprises various forms, all of which have in common a number of individual elements linked together. They are necessarily of great weight and consequently entail a high-power consumption. They are limited by their inability to discharge the material from any point of the track.



TESTING AND ADJUSTING SANDVIK BELTS

BELT AND CHAIN CONVEYERS POSSESS TOO SHORT A LIFE

As a smooth surface would obviously be best suited for the unimpeded discharging of material, it has been suggested to connect by hinges, sheet-metal belts so as to construct an intermediary apparatus between the belt and chain conveyer. However, practice has shown that these chain belts, apart from their unsatisfactory wearing qualities and in spite of careful construction, do not permit as smooth an unloading as belt conveyers proper.

Although belt conveyers have a lower power consumption and possess greater ease of discharging than the chain type, and are safer in operation, still the type so far constructed is not free from a number of disadvantages. In fact, the belts which are in use (balata, cloth and rubber belts) are far from possessing the wearing qualities indispensable to belt conveyers. While high-speed rubber belts, at least under suitable atmospheric conditions, seem to constitute an exception, their use is limited in an extraordinary degree by the steadily increasing price of rubber.

CONSTRUCTION OF THE SANDVIK BELT

The Sandvikens Jernverks Aktiebolag (Sandviken), the well known Swedish steel works, has made an interesting departure by adopting a new material for the construction of belt conveyers. In fact, the hardened steel belts recently put upon the market under the name Sandvik belts, are in every respect an excellent substitute for the belt and chain conveyers so far used.

They are manufactured in lengths up to 100 meters, in widths of 8 to 16 in. and in thickness from 0.03 to 0.04 in., and are readily riveted together to form any length. Wherever a special width is required, two or more parallel belts, as shown by actual practice, can be readily arranged beside one another. These conveyer belts are endless and are set moving in troughs or on any other suitable support by belt pulleys driven, preferably, by electricity.

The manufacture of steel belts of dimensions suitable for transporting purposes obviously afforded great difficulties which were only overcome after extensive experimenting. As they are made of high-grade charcoal steel, Sandvik belts offer high resistance to traction and wear, and as they are very thin, possess a great flexibility. As their uniform surface in course of operation assumes a high polish, the friction on the support is reduced to a minimum.

COST OF MANUFACTURE, MAINTENANCE AND OPERATION IS LOW

Sandvik belt conveyers are especially suited for transporting ore, coal, planks, wood stumps, coke, cement, sand, slag, ashes, sawdust, and any kind of waste material. They are cheaper to install and construct than some other belts, and are capable, by virtue of their hard surface, of sliding over a solid support without requiring the same number of idler pulleys as other belt conveyers. The cost of repair and upkeep is not an important item, as the same belt when properly fitted will last for years, and in case of fracture, can be readily repaired by inserting a riveted piece.

Owing to the small coefficient of friction, the smooth surface of the steel and

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the fact that the resilient belt accumulates the energy expended in inflection around the belt pulley instead of converting it into heat like other belts and chains, the power consumption is low. The material, also, can be readily discharged from any point of the track.

Construction of the Conveyer Trough

The part of the belt concerned in the transport preferably travels at the bottom of a trough of wood or other suitable material, a section of which is represented in Fig. 4. The walls of the trough may be inclined 15 deg. without risk of obstruction and should be lined with sheet metal when handling rough material. A longitudinal profile, on the other hand, should always be straight or convex to prevent the belt lifting off the trough, which would result if some material should accumulate below the belt. Any contact between the belt and the nail heads should also be avoided. If small amounts of pulverulent material should accumulate below the belt, they would still gradually advance in the direction of transport, provided the belt joints be made as represented in Figs. 5 and 6. In order to prevent this material from getting between the belt and the belt pulley, a hole should be made in the bottom of the trough immediately in front of this pulley, as represented in Fig. 4.

Pulleys Built Up of Planks

The belt pulleys, can, of course, be made in different ways. The cheap and suitable design represented in Figs. 1, 2 and 3 is an ordinary wooden drum, the sides of which are made of three to four layers of 1½-in. planks nailed together, while the circumference is formed by planks two to three inches in thickness nailed to these sides. The axles are centered in cast or forged plates fixed to the side walls of the pulleys. The periphery is lined with a rubber belt three to four millimeters in thickness, carefully nailed to the pulley.

Pulley Bearings Should Have Independent Adjustment

The bearings of the belt pulley should be made adjustable through 100 to 150 mm. in the direction of travel, and the two sides should be independent of one another, thus allowing both the tightening of the steel belt and the adjustment of the pulley in the traveling direction of the belt. The belt pulleys can also be made of cast iron according to the usual practice, but in many cases they would be unnecessarily expensive. If so constructed they should be lined at the periphery with wood and rubber which in this case may be riveted to the pulley, or nailed on a wooden lining around the same. The rubber lining is intended to partly compensate the buckling and scratching effect exerted on the belt by material getting between it and the pulley.

The belt pulleys should be at least 1000 to 1200 mm. in diameter. Idler pulleys similar to those represented in Figs. 2 and 3 are used for supporting the returning side of the belt. In the case of extensive plants it will also be found advantageous to install one or two such idlers, both for supporting or adjusting the belt in the direction of the pulleys. The distance between idler pulleys is about 10 meters with the last idler placed about 3 meters from the belt pulley.

The idler pulleys are from 400 to 500 mm. in diameter and are made of iron, or preferably of wood. As far as possible they should be also fitted with self-contained bearings so as to allow accurate adjustment during operation. In the case of conveyer plants installed in the open, especially in winter, the runway of the belt should be provided with radial sheet-metal scrapers for removing snow or waste.

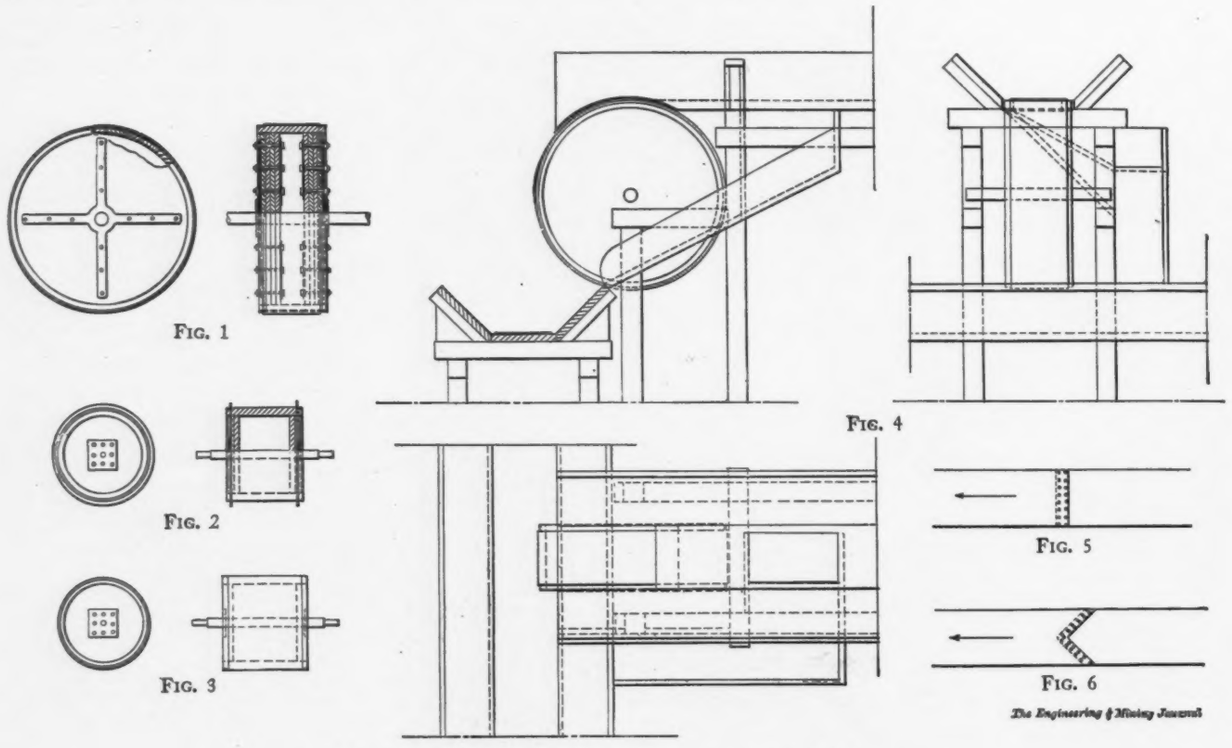

Fig. 1

Fig. 2

Fig. 3

Fig. 4

Fig. 5

Fig. 6

The Engineering & Mining Journal

Details of Construction of Sandvik Belt Conveyer

Splicing the Sections of the Belt

Sandvik belt conveyers are preferably operated by electric motors installed at the driving pulley. The individual lengths of belts up to about 100 m. are joined by riveting, as represented in Figs. 5 and 6. Though somewhat more complicated the method illustrated in Fig. 6 best protects the belt against fracture in the joint, apart from insuring a greater cleanliness of the trough.

A definite tension of the belt is effected by means of the ordinary type of belt stretcher. The ends of the sections to be joined are clamped between two wooden jaws which are approached to one another by means of the customary screws, after which the two ends are simply riveted together. The riveted joints should be symmetrical to the longitudinal

direction of the belt so that the latter may run smoothly in the trough and over the belt pulleys.

The two ends of the belt having been lapped to about 60 mm., are riveted together by two rows of rivets, each about 4 mm. in diameter, and at 30 to 35 mm. distance apart. In order to prevent the steel from rusting, the inside surface of the belt ends should be previously coated with linseed oil, tar or the like.

Whenever feasible, the material should be charged on the transporting belt as far away as possible from the rear belt pulley, so as to keep this free and readily accessible. The load is discharged from the belt either by means of a scraper located at any point of the track, or by pouring out over the front belt pulley.

The scraper used in the former case, in its simplest form, is a slanting plank placed upon the belt. Through an opening in the trough the conveyer can be discharged partly or completely. When the material is to be discharged simultaneously on both sides, the scraper is given the shape of a plow. On account of its smooth surface, the conveyer belt can be freed almost completely from even the smallest particles.

The capacity of the conveyer belt is proportional to the speed, and approximately to the square of its width. The lower the speed, the less will be the wear and tear by friction and consequently the greater should be the width of the belt. Under ordinary conditions, 50 m. per min. is a suitable speed, although in some cases up to 100 m. should be reached.

TRANSPORTING FIREWOOD ON SANDVIK BELTS

WIDTH OF BELT IS A FUNCTION OF MATERIAL TO BE CARRIED

The width of the belt primarily depends on the kind of material and secondarily on the quantity to be transported. Accordingly there are three classifications, namely: (1) Planks, boards, laths, etc.; (2) ore, charcoal, chopped firewood, blocks, etc.; (3) sawdust, shavings and other waste materials. Under class 1, the width of the belt is mainly determined by the width, in class 2, by the length, and in class 3, by the quantity of the material.

In the first class the width should be chosen at about 1.5 times the width of the material to be transported. In connection with class 2 the width should be chosen at least equal to the maximum length of material, whereas in class 3, the conveyer belt should be able to carry the material without the latter coming into contact, to any considerable extent, with the side walls of the trough.

It is difficult to make any general statement in regard to the power consumption of a conveyer plant with Sandvik belts, as in addition to the kind of materials to be transported, the weather conditions and other factors are important. Generally speaking, the amount of power consumed is low, for the number of idler rolls is small, the belt surface very smooth and the energy expended in bending the belt around the belt disk is stored in the belt, owing to the elasticity of the steel. This stored energy is put to account later on.

EXAMPLES OF SANDVIK INSTALLATIONS

One plant installed a Sandvik belt 400 mm. in width to convey, at a speed of 50 m. per min., about 50 cu.m. of charcoal per hour. The length of the belt between the disks is about 120 m., and the power consumption for the empty belt, inclusive of the gear and motor, amounts to about 3.6 e.h.p. When the belt is filled with charcoal, the power consumption increases to 5.1 h.p., the gearing and motor alone requiring 2.1 h.p., whereas the power consumption of the belt and belt disk at no load and full load is 1.5 and 2.9 h.p. respectively.

In another plant two parallel Sandvik belts, 300 mm. in width, traveling beside one another with a distance of about 150 m. between belt disks, transport about 100 cu.m. of charcoal per hour. The power consumption, at a speed of 50 m., is with no load 6.3 and with full load 9 h.p. The pulling part of the belt passes over a charcoal bunker 9 m. in hight and 100 m. in length.

The third plant, shown in the accompanying halftone, comprises a Sandvik belt 410 mm. in width for transporting chopped firewood. The distance between belt pulleys in this case is 80 mm., and the power consumption with full load at a speed of 50 mm. per min. is about 4 e.h.p., although in addition to transporting the material the belt is also lifted to a considerable hight.

Most of the installations so far completed are situated in the northern parts of Sweden. After several years of careful testing, Sandvik belts have recently been put upon the market.

At the Etta mines, 16 miles east of Hill City, S. D., large exposures of spodumene have been opened by leasers, and shipments have been made, from time to time, for several years, to the Standard Essence Company, of Maywood, N. J.

Ore Reserves of West Australia Gold Mines

LONDON CORRESPONDENCE

The Golden Horseshoe Estate and the Associated Gold Mines, two of the most prominent of the West Australian gold mines, have lately suffered in reputation by an appreciable fall in the value of the ore crushed and consequently in the profits realized.

The Golden Horseshoe recovered, from the ore crushed during 1908, 49s. per ton. During 1909 the grade of ore crushed was even lower. In January of 1909, 46s. per ton was recovered from which figure there was a decrease to 36s. in December, followed by the still lower average of 30s. 6d. for the first six months of 1910.

Decrease at Golden Horseshoe Unexpected

In the published figures of this company there was nothing to suggest the possibility of such a drop in value, on the contrary they justified the expectancy that the good results would be maintained. These figures are shown in Table I and II. From such ore reserves as were declared at the end of 1909 it was reasonable to conclude that throughout 1910 the ore crushed would yield on an average about 40s. per ton whereas only 30s. 6d. was recovered to June 1.

Difference of Opinion Regarding Cause of Decrease

Regarding this fall in value, the chairman of the company stated at the annual meeting held on May 4, 1910, that the decreased recovery "was due to unavoidable causes of a temporary nature." The reason given for this was that "preparatory work was unfortunately delayed in some of the stopes by reason of the fact that he (the manager) was unable to get the work sufficiently ahead. This necessitated the drawing of a large proportion of ore from the lower grade stopes in order to keep the mills fully supplied." Assurance was given that this temporary decrease in the output would "be made up in the course of a few months." However, with the cabled returns for June, 1910 was the message, "decrease caused by grade of ore not coming up to expectation, gradual increase in returns expected." That the grade of ore crushed does not come up to expectations, and that the ore reserves which the manager has stated to be conservatively estimated have in the test of actual working proved to have been overestimated are then the true causes of the decrease in recovery.

TABLE I. ORE RESERVES OF GOLDEN HORSESHOE MINE AT THE END OF EACH YEAR.

Year.	Tons.	Ounces per Ton.
1899	151,809	1.486
1900	233,265	1.569
1901	278,644	1.653
1902	543,918	1.436
1903	785,473	1.084
1904	954,631	0.902
1905	931,307	0.752
1906	992,867	0.685
1907	1,062,332	0.612
1908	1,065,409	0.594
1909	1,071,638	0.554

TABLE II. ORE CRUSHED AT GOLDEN HORSESHOE MINE.

Year.	Tons.	Ounces per Ton.†
1900	76,532	1.980
1901	98,849	2.170
1902	122,019	1.920
1903	152,321	1.520
1904	181,191	1.180
1905	223,035	0.850
1906	243,026	0.726
1907	247,020	0.685
1908	247,740	0.675
1909	263,361	0.620
1910 (6 mo.)	149,003	0.416

†The figures in this column are obtained by calculation from the bullion actually recovered; the other figures are as published.

Statement of Ore Reserves Unsatisfactory

Because of the close agreement between the ore reserves and the ore crushed in previous years it is difficult to combat the idea that the valuation work has been properly made and that the variation of the ore deposition is alone to blame for the present disappointment. There are considerations, however, which would suggest that the statement of the ore reserves in the annual report leaves something to be desired.

It must be remembered that this is a large mine, working many levels and very many stopes. To suggest, as the manager first did, that the fall in grade was due to some of the stopes being temporarily unavailable, is to suggest that those particular stopes contained high-grade ore. It is the general experience that those mines which depend upon rich ore to keep up the grade of the ore from extensive workings, are liable to disturbing fluctuations in their output. This has not been the record of the Golden Horseshoe in the past but may be the condition at the present time. If only for the light it would shed on this point, the statement of the ore reserves in the annual report should be more detailed and not sum up values and quantities under four headings.

Ore Reserves Overestimated

The manager's more recent statement of ore reserves as at June 30, 1910, which compares with the figures at the end of the year 1909 is shown in Table III. During the six months' time the reserves were reduced by 149,003 tons of 8.32-dwt. grade but seeing that development was proceeding simultaneously it is reasonable to assume that an equal amount of comparatively low-grade ore was developed by the current development. It is therefore evident that the ore reserves were overestimated to the extent of 127,561 oz. which at an ordinary rate of extraction is equivalent to 110,000 oz. of gold or to a profit of £450,000. The sampling and estimation of the ore reserves of the Golden Horseshoe mine is, therefore, open to criticism upon the score of inadequate checking.

TABLE III. ORE RESERVES AT GOLDEN HORSESHOE MINE DEC. 31, 1909 AND JUNE 30, 1910.

	Dec. 31, 1909.			June 30, 1910.		
Orebody.	Tons.	Dwt. per Ton.	Total Contents, Ounces.	Tons.	Dwt. per Ton.	Total Contents, Ounces.
No. 1 lode.....	12,469	7.56	4,710.57	7,333	6.14	2,253
No. 2 lode.....	449,165	9.58	215,054.64	402,200	8.76	176,214
No. 3 lode.....	542,659	11.69	317,107.35	435,005	10.95	238,141
No. 4 lode.....	67,315	16.95	57,051.65	59,054	16.85	49,755
	1,071,638	11.08	593,924.21	903,592	10.32	466,363

Discrepancy in Associated Gold Mines' Figures

Considering the case of the Associated Gold Mines it is seen that this mine declared on March 31, 1909, that the reserves consisted of 483,517 tons of an average value of about 42s. per ton, from which a recovery of 38s. per ton could be anticipated for the year ending March 31, 1910. The actual returns were 33s. 7d. per ton. This fall continued during April, May and June, for which the average value has been about 26s. In addition, the estimate of ore reserves for the year ended March 31, 1910, shows

193,550 oz. of gold as against 241,750 oz. for the estimate of the previous year, a diminution of 48,208 oz. During the year 136,829 tons containing 57,468 oz. were crushed, so that, to balance the account, ore containing 9260 oz. of gold must have been proved by the development during the year; the figures show that 206,312 tons were proved. Hence an overestimate was made in one figure or the other.

The manager of the Associated Gold Mines has recently withdrawn cable his last estimate, disappointing as that was, adding at the same time: "In several places back of stope assays altogether unsatisfactory" . . . "Cannot form any reliable estimate as to ore in sight."

TABLE IV. ORE RESERVES OF ASSOCIATED GOLD MINES AT THE END OF YEAR.

Year ended	Tons.	Ounces per Ton.
March 31, 1907.....	330,278	0.52
March 31, 1908.....	430,414	0.50
March 31, 1909.....	483,517	0.50
March 31, 1910.....	553,000	0.35

All Estimates of Ore Reserves Unsatisfactory

The failure of the methods of ore valuation applied in this case has been so complete that it becomes of great interest to know what they were. The chairman of the company said in his speech at the annual meeting in July, 1909, that the ore reserves were of "ore blocked out." From the remarks made by the general manager at the same meeting the idea is gotten that the value of the ore reserves is determined by the yield of the mine in the previous year and by stope assays rather than from any systematic valuation based upon samples taken during the blocking out of reserves.

In his report for the next year, the manager, realizing that this method had failed him, relied entirely upon the crushing results of the previous five months to give the value for the future. The total ore mined for the five months ended April 30 showed an extractable value of 27s. 4d. per ton, but since then, as stated above, the results have nullified this estimate and the manager has confessed himself incapable of making a reliable estimate, being only able to say that the ore now being crushed assays 6 dwt. per ton of 2000 pounds.

Cumulative Error in Estimates

From these two experiences and especially from that of the Golden Horseshoe, the idea is suggested that the estimate of the ore reserves in a mine which has been working for some years, may contain errors accumulated year by year, and that to check this there should be a continual resampling in progress such as should result in a gradual elimination of original errors. This, of course, would only affect those blocks of ore which, at the time any estimate was being made, were partially stoped away, and concerning which it would be a question as to whether the original average valuation were still applicable.

Better System at Other Mines

In contrast to the above, the case of the other two most important mines on the West Australian goldfield may be mentioned. The Ivanhoe Gold Corporation maintains two separate and distinct estimates of its ore reserves, one being made by the manager and the other by the company's consulting engineers. This procedure, if carried out completely, is certainly a most effectual security against sudden disappointment. In addition the ore reserves are segregated under about 30 different headings, which would show that the mine does not depend upon any very rich stopes, but that the ore is comparatively regular in value. These latter remarks may also be applied to the case of the Great Boulder Proprietary, which, however, does not declare any independent estimate.

Chairman Makes Sweeping Statements

In the annual meeting of the company, held in July, 1910, the chairman brought out interesting points regarding the estimation of ore reserves in the Kalgoorlie goldfield and a manager's responsibility. Referring to the former he said in effect that on the Kalgoorlie field the value of

TABLE V. ORE CRUSHED AT ASSOCIATED GOLD MINES.

Year ended	Tons.	Ounces per Ton.
March 31, 1908.....	119,886	0.54
March 31, 1909.....	125,794	0.54
March 31, 1910.....	136,829	0.42
Three months.....	34,589	0.33

the ore reserves is generally calculated from stope and truck samples and not from the development which results in blocking out the ore. This statement must be taken with some reserve, for it applies only to those mines where the grade of ore shows erratic variations and not to the mines in general.

The second point suggested is that, since the method of computation of ore reserves was declared beforehand, the responsibility of the manager for the figures obtained is lessened. It may, of course, be comforting to the manager to know that he has been so open about his methods, but it must also be remembered that the method of computation was not put before the shareholders for their sanction. Such questions are always claimed by the members of the technical staff of a mine to be entirely within their sphere. Making every allowance it must therefore be said that the technical staff, from the consulting engineer down, must bear the onus of this disappointment.

Consulting Engineer Finds Conditions As Stated

In this connection it is proper to state that the consulting engineer who was sent out at this crisis to assist, has reported by cable as follows: "In my opinion reliable estimate of tonnage and value of ore reserves impossible. The largest portion of the ore blocked out is low-grade ore, pay ore very pockety." The mistake, of course, has been in not recognizing earlier that reliable estimates were not obtainable, certainly not by the method adopted.

It appears now, as is in part confirmed by the above cable from the consulting engineer, that the largest portion of the ore blocked out is of low grade and that heretofore the manager has been able to keep up a certain high grade by drawing ore from a limited number of stopes having ore of considerable higher value. This position was not disclosed in the reports as it undoubtedly should have been; the statement of such a condition would at once have shattered the confidence put in the ore reserves on account of past results.

Early Mining and Silver Production at Cerro de Pasco

The discovery of molten silver in the ashes of his evening fire, by the Indian shepherd, Huari-Capcha, in 1630, led to the opening up of the Cerro de Pasco district in Peru. According to Lester W. Strauss (*Inca Chronicle*), the first "mine scale" was made in 1740 and as early as this, drainage tunnels had been found a necessity.

With the introduction of the first steam pump of Cornish pattern in 1816, the zone of oxidation was passed, sulphides and native silver taking the place of the oxidized ores.

The crude system of mining of the early days, which was fruitful of accidents and costly, is still in evidence. The miners were paid according to the grade of the ore. If in rich ore, the miner carried his *huachaca*, or half portion of the ore broken during the day to the *registro* on the surface. Here the mine owner took out a fifth for pumping expenses, half the remainder for himself, thus leaving one-fifth of the total ore broken as the miners' pay.

The silver production of the district since its discovery is estimated at about 300,000,000 ounces.

At the present time silver ores or *pacos* containing little or no copper are being mined and sold to the Cerro de Pasco company for converter lining. Only ores carrying 30 oz. and over of silver and more than 70 per cent. silica are bought for this purpose.

Recent Practice in Copper Matte Converting

Increased Scale of Operations, Larger Vessels and Improved Appliances Used. Conservation of the Air and Importance of Volume Recognized

BY REDICK R. MOORE*

The process of converting copper mattes has been in use for about thirty years and a review of the improvements that have been made, the reductions in costs that have been effected, with some suggestions where further improvements and reductions in cost may be secured may be of interest.

Important Steps in 30 Years of Converter Progress

The improvements that have been made may be tabulated as follows:

(1) Enlarging the size of the converter vessel has effected higher temperatures through the greater blast volume used, more regular and easier operation and less losses through the production of "slop" and cleanings that must be resmelted.

(2) Enlarging settlers of the blast furnaces has furnished storage for matte and avoided the cost of resmelting matte for the converters in special furnaces.

(3) Putting in the linings with power rammers and using gold, silver and copper ores in the place of barren quartz and clay.

(4) Improved mechanical appliances for tilting converters and machinery for handling matte, slag, blister copper and other products.

(5) Improvements in means of getting the air blast into the matte and preventing leakage.

(6) The introduction of a basic lining in place of the silicious lining, effecting a longer life of lining and avoiding the cost of an expensive relining plant and cranes of great tonnage for handling heavy converters; utilization of silicious ores that would be entirely unsuitable for lining acid-lined converters to flux the iron of the matte.

Theory of Matte Converting

The theory of converting mattes is dependent upon the fact that on forcing a blast of air through a body of molten matte the iron and sulphur will be oxidized with the evolution of sufficient heat so that, (a) notwithstanding the great amounts of heat lost in escaping gases, radiation and conduction, a temperature sufficiently high will be maintained in the converter for the iron oxide produced to form slag, either with the silica of the lining or with the silica or silicious ores added for the purpose, and (b) the mass in the converter will be maintained in a molten condition while at the same time the copper from the matte that might be oxidized will react with the sulphides remaining, forming either cuprous sulphide or metallic copper.

The products are: Metallic copper, carrying the greater part of the gold and silver and a comparatively small amount of the impurities of the matte; slag, containing a small amount of copper, silver and gold, together with the iron from the matte and part of its impurities; and gases carrying practically all of the sulphur of the matte as sulphurous acid, with minute particles of matte and copper and the more volatile impurities such as a large part of the arsenic, antimony, lead and zinc. The position of the impurities, such as lead, arsenic and antimony will depend greatly upon the temperature at which the operation is carried on and how far the conversion is carried, e.g., if, when blowing leady copper matte, the operation is stopped when the sulphur is not quite all burned out (at "gas copper") the copper will still contain comparatively large amounts of lead, arsenic and antimony.

Slag Losses

The amount of copper and precious metals in the slag will under ordinary conditions be sufficient to require resmelting or special treatment for their recovery and the irony slags are generally a welcome addition to the blast-furnace charge both for their fluxing power and excellent physical condition.

By removing the slag that has formed before the metal is "high" the copper and other losses may be kept quite low (below 1 per cent. for copper) in the greater part of the slag formed. The matte is "high" when the iron has been removed to below 2 per cent., although the copper may vary from 64 per cent. to 77 per cent. in lead-copper matte and copper matte; with nickeliferous copper matte, the percentage of copper may be much lower.

Foaming

When the matte has reached this stage, the slag or most of it must be removed, or foaming will take place, possibly resulting in throwing the whole charge out of the converters. This foaming is apparently due to an accumulation of copper oxide or silicate in the slag, to such a point that a violent reaction, represented by the equation

$$2Cu_2O + Cu_2S = 6Cu + SO_2$$

takes place between this copper oxide and the sulphide of the matte or white metal.

This reaction is strongly endothermic, representing a heat absorption of 38,640 cal., which quickly makes the slag viscous and hence foamy. The exact conditions when this foaming will take place have not been thoroughly worked out, but the reaction seems to be most violent and noticeable at lower temperatures. This would be expected from the endothermic reaction and analogy with the lead sulphate-sulphide reaction which scarcely takes place at all at high temperatures.

Foaming is certain to take place if the matte is blown beyond the "high" point in the presence of large amounts of irony slag. It is on account of this reaction and on account of the high-slag contents of metals when blown beyond the high point that all methods for the direct conversion of ores to metallic copper, such as were suggested and patented by Hollway, Garretson and others, must necessarily fail.

Size of Converters

The improvements that have been made due to the enlargement of the converting vessel have been limited, in the acid-lined converter, by the mechanical means that have been installed for handling the vessels and relining them. Owing to this limitation, little change has been made in the last few years in the size of the converter—the largest vertical converters, 8 ft. in diameter and 16 ft. high, have been in use at Aguascalientes for over 15 years; and the largest acid-lined horizontal converters 8 ft. in diameter by 12½ ft. long, have been in use for over six years. The more recent installations have been mostly of smaller sizes, 7 ft. by 14 ft. and 8 ft. by 11½ ft. respectively, or smaller. Although the International plant at Tooele, Utah, is installing 8x12½-ft. barrel converters which would indicate that size to be entirely satisfactory at Anaconda.

The large-sized settlers of round or elliptical section that were made necessary to avoid resmelting mattes have proved a considerable improvement to blast-furnace practice as well as to converting, and no one would consider erecting a large copper-blast furnace now without a large settler whether converters were to be used or not.

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The advantage of thorough tamping of the converter lining was appreciated some years ago and adopted generally. The usual appliance in use is an air-hammer hung on a traveling carrier from a movable jib-crane arm.

Converter Lining

The use of the silicious ores in the place of quartz or quartzite has made a market for ores that would otherwise not pay the cost of smelting. The use of clayey ores and tailing slimes has introduced quite a saving as compared to barren clay, but the supply of clayey ores is now insufficient in Mexico and barren clays are being used extensively, as tailing slimes do not always contain the binding qualities that are necessary. Attempts to use the slimes from the Utah Copper mill were unsuccessful at Garfield.

It is important in putting in acid linings that it should be correctly tempered with just the proper amount of moisture to produce a hard homogeneous mass when tamped. Making a fixed number of linings per shift, or putting out relined converters regardless of the manner and thoroughness with which they are tamped, results invariably in short life and more expensive relining in the end. When correctly mixed and rammed the lining should require but little drying.

Excessive amounts of fines in the silica make it unfit for lining and considerable amounts of iron oxides or lime greatly reduce the life of the lining on account of their fluxing action. For this same reason the clay used for a binder should not contain much of such fluxes, as soda, potash, iron or manganese oxides, or lime. A clay otherwise suitable but containing as high as 5 per cent. and 6 per cent. CaO as gypsum, was used at Garfield, but did not give a satisfactory life of lining.

To be entirely suitable for lining acid converters, the clay should be refractory enough to hold the particles of silica until they are entirely fluxed by the iron oxide formed in the bath of matte. Otherwise pieces of silica are loosened from the lining and floated out with the slag unfluxed.

Mechanical Appliances

A great many improvements have been made in machinery for tilting devices, but the arrangement utilized on the Pierce and Smith design of basic-lined converter is probably the simplest and most economical. This consists of two wire ropes, one end attached to the converter with the other end of each attached to the heads of the plungers of a hydraulic cylinder, set on opposite sides of the converter. These avoid the use of the rack and sector and give a very steady and easily regulated motion to the converter. Of course, either alternating- or direct-current motors could be used in place of the hydraulic cylinders if preferred, or in a cold climate where the use of water is likely to give trouble from freezing.

For handling matte and shells for relining, the traveling electric crane is in general use and in most recent plants the furnaces and converters are arranged for the handling of the matte from the settler directly to the converters by the crane. In another system in use at Aguascalientes since the converters were installed, there are no cranes; the matte is handled from the settlers to hydraulic platform elevators, each serving two stands, by ladles set on trucks with worm gears for tilting. The ladles are hauled by steam locomotives, and the contents poured into the converters through a movable, curved, clay-lined spout. The shells are handled into and out of the stand by other hydraulic platform elevators, constructed directly underneath the stands on special tracks built for the purpose. They are handled by hand-car movers to a transfer table and in the same manner to any desired relining stand.

At Anaconda, where the converter building is separate and removed from the furnace buildings, the matte is hauled from the furnaces to the converters by locomotives with ladles set upon trucks and there poured direct from the trucks to the converters through short launders.

Without careful analysis and complete understanding of conditions anyone would be inclined to label the first methods modern, uptodate and economical; the second, out-of-date, crude and expensive, and the third, double handling; in fact, I have heard these identical adjectives applied to the several methods by metallurgists who had not operated any of them, or only one of them, and had not taken special conditions into account.

Mechanical Methods Compared

The special disadvantages of the first method as compared to the second are: (1) Higher first cost; (2) Greater repairs and upkeep charges; (3) Breakages; (4) Danger from heavy loads carried overhead and demoralization of operators of converters; (5) Inefficiency of crane operators from smoke, fumes and explosions; (6) Inability to operate furnaces efficiently in an atmosphere heavily charged with converter gases.

It may be said that it is always cheaper to transport on the ground level than by any means that move small loads in the air overhead, and the repairs to motor or engine, cars and tracks are also much less. At Aguascalientes the cost per ton of copper for delivering matte to the converters and handling slag from them to the slag beds was only a small fraction of the cost of the same operations at Garfield, although the output was only one-half or thereabouts.

The method at Aguascalientes had several obvious disadvantages that could readily be avoided in building a new plant. It should also be taken into account that they have cheap and efficient labor when intelligently handled as compared to the Greek and "Hun" of the northern smelteries. Where there is sufficient difference in levels the hydraulic platform hoists for hoisting the matte cars could be avoided and the matte poured into the converters from the matte-tap level by short launders. The hydraulic hoists for changing converters, which are an ever-present source of danger, could be replaced by a heavy short-span crane for handling converters to relining stands. A crane for handling heavy material is practically a necessity in any case.

The suffocating gases from the converters while pouring copper, turning up and down, etc., are abundant reasons for placing the converters at a distance from the furnaces and the difference in efficiency and "morale" of the men employed on the furnaces should much more than pay the cost of the transportation and handling. High buildings are not a panacea for smoke and fume troubles, especially if they are left open all around the bottom so that the wind can blow through and cause enough suction to neutralize any draft that would otherwise be obtained. Working in an atmosphere of sulphurous-acid gas for eight hours, it is to be expected that the cranemen will be far from efficient and that the breakage and accidents will be excessive.

Handling the Blister Copper

For handling the blister copper, bullion furnaces and tilting ladles with casting machines have been installed in a number of the larger plants. Such installations allow for the prompt release of the converter when its charge is finished and when properly designed and operated should make for cheaper handling and loading of the blister copper and a cleaner product for shipment. Smaller plants use the system of pouring into molds, placed on trucks and moved by hand or by the motive power used for handling the slag. By setting a three-spout ladle under the launder that is used to break the fall of the stream of copper, three molds may be filled at a time.

The molds for casting the copper are a considerable source of cost and annoyance. They are usually made of cast iron although copper molds with a plate of cast iron in the bottom where the stream strikes have given good satisfaction. To allow accurate sampling at the refinery the copper must be cast into thin plates. A thickness of two to three inches is generally acceptable. Wraith's experiments[1] sampling anode copper at Anaconda confirm this.

[1] *Bull.* A. I. M. E., March, 1910.

Disposal of the By-products

The slag is generally skimmed into slag pots on tracks directly beneath the converter although in some places it is handled by cranes either to blast-furnace settler or reverberatory furnaces. Where it is skimmed into slag pots it is either cast in casting machines and delivered from the machine into railroad cars for transport to the furnace bins or cast into beds, broken up by hand and elevated to furnace bins especially constructed for the purpose. The latter plan is expensive where labor is high. There are two systems of casting in use—one consisting of a set of sheet-iron pans on a moving chain belt; the other system being a series of stationary cast-iron molds arranged for dumping into bins. The slag is tapped into these from a side taphole in a slag car running along the molds. This latter system designed by Kelly, of Salt Lake City, has the disadvantage that the engine and crew are tied up while the slag is flowing.

The other by-products are the slop and splash around the converters and the flue dust and flue accretions. In a properly operated plant these products (except the flue dust) may be handled again into the converter and form welcome additions for cooling down hot charges.

Where the operations are not carefully performed these products and the shells or skulls from the ladles with cleanings from converter shells at the relining plant, cannot be resmelted in the converters and will form a considerable percentage of the furnace charge, resulting in increased smelting costs. The excessive formation of these products results from the following practices: Overcharging converters; overflowing charges; improperly tamped linings; poor lining material; or poor joints between the bottom and cap. Probably the most fruitful cause is overcharging in the rush to make tonnage.

Complete Utilization of the Oxygen Introduced

The oxygen of all air introduced into the bath of matte is completely utilized for combustion, even with a thin layer of matte above the tuyeres. This fact was proven by John Hollway as long ago as 1878 in his experiments on converting mattes at Penistone[2]. Analyses of the gases from converting showed no oxygen. Of course, it would be possible to make conditions in which all of the oxygen is not utilized, such as too thin a layer of matte over the tuyeres, or too large tuyere openings, but with the tuyeres not larger than 1¼ in. diameter and a few inches of matte over the tuyeres all the oxygen is utilized. Indeed, if any considerable amount of oxygen escaped combustion the cooling effect of the heat taken up by it and the associated nitrogen would be immediately apparent.

[2]*Journ.* Soc. Arts, Feb. 14, 1879.

Some experiments which I made in 1904 with a view to ascertaining the amount or depth of matte necessary to give complete utilization of the oxygen may be of interest although some of the data were imperfect. The specific gravity of the specimen matte, at 60 deg. F., was 4.91; of the specimen slag was 3.84, and of the white metal, 5.72. The diameter of the newly lined converter was 3 ft. with the top tuyere opening 8 in. (0.666 ft.) above the bottom. But as the matte, slag and white metal must have a much lower specific gravity at the high temperature and molten condition obtaining, I have used the specific gravity 4.5 for matte; 3.5 for slag and 5.5 for white metal for the calculations, as these figures are close enough for the purposes. With a charge of 7110 lb. matte, using the specific gravity given, we have at the start 25.280 cu.ft., which is equivalent to 3.576 ft. depth of matte; or 3.576 ft. — 0.666 ft. = 2.91 ft., the depth of matte above tuyeres at the start of the blow. At the end of the blow, the converter measured 3½ ft. inside diameter at the tuyere line and the bottom was about 1 ft. below the tuyeres, as nearly as could be measured when the copper was poured, and the converter contained 3459 lb. white metal and 5203 lb. slag by calculation. The slag removed weighed 4925 lb., but a small amount remained in the converter. The 3459 lb. of white metal occupied 10.06 cu.ft., which gave a total depth of 1.05 ft., or a trifle above the tuyeres when the converter stood upright.

With the vertical converter in use it could not have been possible to have had over 6 in. of matter over the tuyeres, even allowing for errors of measurement, and tilting the converter back as far as possible; on this blow, calculating the amount of oxygen in the air supplied (piston displacement) at the temperature, barometric pressure and humidity obtaining against the oxygen required for the theoretical elimination of the iron, sulphur, etc., an efficiency of 74 per cent. was shown, which was a little better than the average at that plant at the time.

Loss of Air Used in Converting

The amount of air used for converting is generally stated as free air (piston displacement) per ton of blister copper produced. To determine the efficiency of the air in addition it is necessary to know the temperature of the air at the blower intake, the barometric pressure, the humidity, the weight and analysis of the matte converted and of the slags, gases, flue dust and bullion produced. Many of these data are not kept in any plant with which I am familiar, but fairly close estimates may be made from the analyses and weights of the matte and bullion. This will serve for comparisons, or theoretical efficiency.

The losses of air may be stated as follows: (1) Loss due to temperature and humidity of air when taking signal-service temperature and humidity instead of actual inlet temperature and humidity, with the inlet in the engine house. This loss may amount to over 5 per cent. when the outdoor temperature is low and engine-room temperature is high and contains considerable escaping steam.

(2) Slippage and volume efficiency of the air cylinders will show but a partial delivery to the air lines, amounting probably with well managed engines to not over 90 per cent. of the piston displacement. The volume efficiency may be measured from the indicator cards of the air end, but I do not know how accurately. One set of cards gave 93 per cent.

(3) Loss of air from safety valves and pipe leakages. This may be minimized by care on the part of the engine men and frequent inspection of air lines.

(4) Loss of air in turning up or down converter and stopping and starting engines, where but one converter is in use.

(5) Loss of air in connections to converter tuyeres and through defective or worn tuyere valves. This may be avoided largely by well designed and finished connections and due care.

(6) Loss of air through cracks and crevices in the lining. This may be reduced largely by larger tuyere openings, solid tamping in of lining and care in driving tuyere bars. Baggaley[3] and Pierce and Smith[4] have attempted to ob-

[3]U. S. Pat. No. 865,671, Sept. 10, 1907.
[4]U. S. Pat. No. 942,346, Dec. 7, 1909.

AMOUNT OF AIR USED IN CONVERTING AT DIFFERENT PLANTS.

Plant.	Kind of Matte.	Time.	Cu.ft. per Ton Blister Copper.	Bullion, Cu.	Grade of Matte.	
					Pb.	Cu.
A	Copper	3 mo.	235,587	99.5	.....	39.0
B	Copper	1 mo.	262,400	99.0*	.....	42.0
C	Copper	1 yr.	151,346	99.0*	.....	41.9
D	Copper	1 yr.	173,968	99.0*	.....	42.8
E	Copper	1 yr.	165,368	99.0*	5.0*	43.0
E′	Copper	1 mo.	141,125	99.0*	4.5*	43.8
F	Copper	3 mo.	125,880	96.5	3.1	43.3
F′	Copper-lead	1 mo.	91,412	95.0	19.0	40.2

*Figures from memory.
B, C, D are stated amounts and I do not know whether allowance for slippage was made or not. *E* and *E′* are plant figures allowing for slippage which I have corrected to actual engine displacement. *A, F* and *F′* are actual piston displacement as calculated from dimensions of air cylinders and revolution-counter records. Analyses are arithmetical means of daily samples and may not represent the actual averages.

viate this by using metal tuyeres extending through the lining, and some of the earlier converters turned out by well known manufacturers had metal tubes to extend through the lining.

(7) Loss of air from tuyere punching. This may be reduced to a minimum by a reducer in the outer end of tuyere of such a size as to allow the punch rod to enter readily but not leave a large opening around the rod. It may be further reduced by peepholes in the tuyere cap (not with Dyblie tuyeres) so that the puncher can see the condition and not punch except when necessary.

Best Types of Tuyere

The Aguascalientes tuyere, which consists of a simple dovetailed casting with a removable wedge to fit the dovetail, fulfill all these conditions and when taken care of, gives as good air efficiency as any with the exception of the improved individual Dyblie tuyere designed by Pierce and Smith and shown in the Journal of March 12, 1910. The only disadvantage to the latter is that on account of the ball valve, the conditions cannot be seen and it must be punched whether it needs it or not. The necessity for punching may be greatly reduced by running the converters hot.

Amount of Air Used in Converting

The amount of air in cubic feet, reduced to sea level but not corrected for temperature or humidity, used at several plants, together with grade of matte and approximate grade of bullion in lead and copper are shown in the annexed table.

Plants *A* and *B* on the one hand and *C* and *E'* on the other represent the difference between good and bad work with acid-lined converters, while *F* represents what can be done with extreme care in basic-lined converters. The low grade of the bullion in *F* and *F'* is due to the extremely dirty antimonial and arsenical ores and by-products treated, and nickel and cobalt contents. *F'* was made treating a highly arsenical and antimonial leady matte. This matte upon converting gives over 100 per cent. theoretical air efficiency if all the lead, zinc, sulphur and arsenic eliminated are calculated as burned to oxides. But as noted by Hollway and since verified by me the lead, zinc and arsenic (or at least the major portion of them) that appear in the fume, are volatilized as sulphides from the bath and only the lead, arsenic and zinc remaining in the slags are subjected to oxidation by the blast. The volatilized sulphides are, of course, very quickly burned by the atmospheric air after they leave the mouth of the converter.

After deducting the PbS, ZnS and As_2S_2 corresponding to the amounts of these metals recovered in the flues and baghouse with an addition of 10 per cent. to cover losses, the extremely high theoretical air efficiency of 88 per cent. was found for this series.

Loss of Air by High Blast Pressures

(8) A fertile source of loss of air is the use of high blast pressure. Most writers in speaking of converting, or for that matter smelting also, give the blast pressure but make no reference to blast volume. Blast pressure simply means velocity head, friction in pipes, tuyeres and body of converter and throat and the static head due to the column of matte over the tuyeres.

The static head per foot of matte, white metal and slag over the tuyeres may be calculated, taking the specific gravities for the molten substances at 4.5, 5.5 and 3.5 respectively, as follows: For matte, $4.5 \times 0.4382 = 1.98$ lb. per sq.in.; for white metal, $5.5 \times 0.4382 = 2.38$ lb.; and for slag $3.5 \times 0.4382 = 1.51$ lb. As a column of 34 ft. of water gives a pressure of 14.7 lb. per sq. in, any other liquid will give a pressure of 0.4382 times the specific gravity for each foot of depth, and the total pressure of blast due to static head in the converter need be no more than two to four pounds per square inch.

Volume and Not Pressure of Air Is Wanted

The velocity head to put the volume of blast through pipes and tuyeres can be reduced by increasing their size. In like manner the friction in the tuyeres may be reduced by increasing their diameter and number. Blast pressure has nothing to do with the work of converting, but only with overcoming the various mechanical resistances; e.g., one might have a pressure of 100 lb. or 1000 lb. and do no converting if the tuyeres were not opened, while with a well designed converter 5 lb. to 10 lb. pressure is ample to get the volume of air into and through the matte.

Air has the same composition everywhere (with the exception of variations in humidity and carbonic acid). The same weight of air will do the same work anywhere in the oxidation of the sulphur and iron, etc., of the matte, if brought into the matte, and the greater the weight of air utilized within a definite time the more rapid the performance of the work and the higher the temperatures maintained (the latter only as radiation and conduction are functions of time).

It was long supposed that more fuel was required for lead smelting in Leadville than at the valley plants[5] and I have seen a number of ingenious although fallacious attempts to show the reason why. The fact is it does not take any more fuel for the same charge at Leadville than anywhere else. This fact is well shown by the amount of fixed carbon used per ton of charge in that it is no greater there than at other plants in recent years. A possible reason for the use of more fuel at Leadville than in the valley smelteries in the earliest operations would be the use of manganese-iron ores in large quantities as the requirements of carbon for the reduction of MnO_2 is much greater than for Fe_2O_3 as shown below.

$\overset{160}{Fe_2O_3} = 2FeO + O$ or 160 lb. Fe_2O_3, requiring 6 lb. C, while $2\overset{174}{MnO_2} = 2MnO + O_2$ or 174 lb. MnO_2 requiring 12 lb. for their reduction to FeO and MnO respectively. The difference 6 lb. C corresponds to about 7 lb. of coke and the increased amount of coke to perform the reduction might amount to as much as 1 per cent. of the charge in some cases.

Blast Pressures

It has also been stated that higher blast pressure is necessary at higher altitudes to maintain the temperature of the converting process. This may be the case if pressure above atmospheric pressure is taken, although I cannot see any reason for it; but it is absolutely certain that it is not the case if absolute pressures are used. Of course, it will require more power to produce the same weight of oxygen in the blast at a higher temperature or altitude than at a lower one. The blast pressures and volumes per converter now in use at various plants are about as shown in an accompanying tabulation.

At Aguascalientes in 1904 the vertical converters were using 18 to 20 lb. of blast pressure with tuyeres formed by driving ¾-in. bars through the lining. The engine was run on speed (instead of pressure) using 28 r.p.m. when blowing one vessel and 56 r.p.m. when blowing

[5]Hixon, "Lead and Copper Smelting," p. 58; Hofman, "Metallurgy of Lead," p. 304.

COSTS OF FREIGHT, REFINING, SELLING, ETC., ON COPPER BULLION.

Plant.	1905.	1906.	1907.	1908.	1909.
Anaconda	.....	$36.27	$31.65	$30.51	$30.07
Highland Boy	.....	28.91	32.48	26.56	27.50
Granby	$38.88	.....	.....	.....	.....
Garfield	.....	.....	.....	20.00 est.	....

AIR USED AT CONVERTING PLANTS.

Plant.	Pressure.	Cu.ft. of Air per Minute.
A	16 lb.	6000
B	13 lb.	4800
C	11 lb.	5320
D	12 lb.	5200
E	15 lb.	6000
F	11 lb.	6500
G	20 lb.	....

two. This gave a piston displacement air volume of 5628 cu.ft. per min. per converter and if tuyeres needed punching it was quickly indicated on the pressure gage. By increasing the size of the tuyere holes, driving 1⅛-in. bars to form the opening through the lining, the pressure required was reduced by about five pounds.

The result for the first 20 days' run with enlarged tuyere openings as averaged by the general manager from the Bristol recording pressure-gage cards, was 14.7 lb. pressure, as against 18.7 lb. for a coresponding period under the same conditions before the change was made. By using punch bars 1¼ in. in diameter, and opening three more tuyeres we secured an average pressure of about 12 lb. over a considerable period, while maintaining the same engine speeds. This should represent a saving of one-third of the power cost. In addition to the direct power saving an increased air efficiency of about 20 per cent. was obtained with the corresponding increase of converter capacity of over 20 per cent.

Further efforts to reduce the blast pressure by enlarging the tuyeres to 1½ in. in diameter resulted in the end tuyeres filling with matte when turning the converters up or down. The number of tuyeres could not be increased on the vertical type of converter without seriously impairing the strength of the lining in the tuyere plane.

Costs

The costs of converting are very generally calculated upon the tonnage of copper bullion produced. A better basis would be the cost per net ton of fine copper produced, or possibly copper plus silver. While the latter will give a much higher cost to one doing just as cheap work upon lower grade mattes it would be difficult to select a more desirable and equitable method. When the grade and character of the matte are taken into consideration, reasonable comparisons may be made especially if the costs are subdivided as they should be into:

SUBDIVISION OF COSTS.

Converting
- Labor
- Supplies and tools
- Repairs
- Fuel
- Power
- Matte and slag handling
- Assaying and laboratory
- General expenses, taxes, insurance, etc.
- Salaries

Bag House
- Labor
- Bags
- Power

Relining
- Fuel drying
- Labor
- Power
- Tools and supplies
- Repairs

Resmelting
Scrap, slags and matte.

Resmelting matte, where matte is not taken by converters as produced by furnaces, should be a charge to the converter plant, whereas resmelting and concentrating matte too low grade for converting should be a blast-furnace charge. Smelting matte where the matte is purchased or produced by another department (considering the converters a part of the copper department) is not a proper charge to converting. It should be taken care of by a separate charge for that purpose, which will become a credit to the smelting department to offset the smelting costs and losses.

Baghouse Expense Not a Converter Charge

The baghouse expense is not a proper charge to converting as the bag house can only be installed for the purpose of saving the lead in leady mattes. The cost of saving the lead is naturally a charge to the cost of the production of lead and not to the copper which the converter is only supposed to produce.

The baghouse only serves to collect the lead fume in a form wherein it can readily be smelted into bullion and, being practically free from copper, it will appear as bullion with the exception of the smelting losses.

The lead remaining in the bullion from incomplete oxidation will be saved in the refinery and finally returned to the lead department and the extra cost will in the ordinary course of events be charged to the bullion in the treatment charges for refining.

The refinery may decline to pay for the lead in the copper bullion, but even if not paid for its value after deducting costs of conservation should appear as a credit to refining margins and a charge to refining costs. With such a system of subdivision of costs, comparisons would be readily made taking into account all the variations in costs due to local conditions, such as price of labor, coal, power, etc. Using a basic-lined converter the costs of relining, drying and handling silicious ore to the converter would be put over against the cost of relining and drying the acid-lined converters.

Unfair Cost Distribution

Operating a plant with a general manager of a mechanical and inventive turn of mind and who is the actual, if not the titular construction engineer, has its disadvantage to the metallurgist who is required to make cost showings in comparison with other plants. Under such conditions cheap construction costs, well within the original estimates, are made at the expense of operating costs. In one plant which I have in mind completion of the converter building was charged to general repairs, and fully one-half of the supplies and repair costs was due to the installation of a copper-casting device that failed to cast, making a total cost of about one dollar per ton of bullion produced.

Such practices in the struggle for position and prestige are not at all as uncommon as might be supposed, and when they do occur they try the patience and diplomacy of the operators who suffer to the utmost by them. I have known also of cases where the construction accounts were charged with work done for the operating account, but this only serves for another illustration of dishonest practice.

Basis of Cost Calculation

Converter costs are calculated on various bases. Eliminating baghouse and resmelting and smelting mattes, the approximate costs per ton of bullion as shown in the annexed table may be said to obtain, although some of them may or may not include their proportion of general expenses, taxes, insurance and salaries.

COSTS PER TON BULLION.

Plant.	Cu.		Cu.		Cu.		Cu.	
	%	$	%	$	%	$	%	$
A	38.2	8.40	39.0	8.55	41.1	7.73	41.1	*5.76
B	42.8	8.50	....	....	....	....	....	....
C	41.9	9.00	....	....	....	....	....	....
D	43.5	4.53	42.7	4.92	41.6	5.30	....	....
E	40.2	4.47[a]	....	....	....	....	....	....
F	42.6	9.76	42.6	9.86[a]				
G		11.41	....	....	....	....	....	....

*Basic lined. E and F, lead-copper mattes. F, from memory, probably including smelting, matte and baghouse costs.
[a] "The Mineral Industry," Vol. 16, p. 43.

The costs of freight, refining, selling, etc., on the copper bullion varies largely with the freight rates and the intimacy of the relations of the shipper with the refiner and with the refining and selling cost profits. From the annual reports of the companies I have calculated the costs for these items per ton copper.

As the freight from Salt Lake and Anaconda is said to be the same on copper bullion, i.e., $10 per ton, the Highland Boy must have paid less selling commissions in 1906 and 1908 than Anaconda.

The profits on the treatment of 150,000 tons at the Raritan refinery are stated to be $1,000,000 per annum, equal to say $6 per ton, leaving after deducting freight over $14 per ton for refining and selling costs. These costs do not include their proportion of general expenses and administration.

The costs of converting, freight, refining and marketing per ton of ore or charge will vary directly with the ore contents saved in the process. For example, take two ores: No. 1 contains 1.5 per cent. copper on which a saving in

concentration and reduction of 66⅔ per cent. is made, resulting in 1 per cent. copper production. Converting costs equal 1 per cent. of $8 or $0.08. Freight, refining and marketing equal 1 per cent. of $32 or $0.32, or a total of $0.40 per ton of ore. No. 2 contains 13.4 per cent. copper, on which a saving by direct smelting of 97 per cent. is made, resulting in 13 per cent. copper production. Converting costs equal 13 per cent. of $8 or $1.04. Freight, refining and marketing equal 13 per cent. of $32 or $4.16, a total of $5.20 per ton of ore. These costs are ordinarily deducted from the price paid for the copper in the purchase of ores.

Further Improvements and Reductions in Costs

The points at which further improvements and reductions in costs may be looked for are:

(1) Further enlargement of converting vessel.

(2) Improvements in linings and care in putting them in.

(3) Enlargement of tuyeres, care of joints and reduction of blast pressure.

(4) Converting higher-grade mattes.

(5) Improvements in appliances for handling slags and slop.

(6) Taking air from outdoors in coolest and dryest possible condition.

(7) Conservation of gases and fumes and heat of gases.

My calculations of the heat in converter gases show that their heat if utilized for the production of steam in boilers will give more than enough power for the operation of the converters.

The utilization of the gases for the production of sulphuric acid will only be profitable where there is a market for the product. The saving of the zinc and lead contents in the gases should generally be profitable where the product is considerable enough to warrant the installation of the necessary plant. Each plant will necessarily have its own peculiar problems to work out.

Grothe-Carter Vacuum Filter

The British Government has issued Pat. No. 18060 of 1909 to Albert Grothe and Herbert Fuller Carter of Mexico, for a vacuum filtering apparatus. The device consists of a rotating table having separate self-contained filter boxes with a discharging device to operate and empty the contents of each box by inversion at a predetermined point of travel. The boxes are fed successively from a stationary device and mounted on a rotating table so that each box is in turn placed in communication with a source of vacuum through a central controlling cock.

In the accompanying illustrations, Fig. 1 shows the construction of the table; Figs. 2 and 3 show a plan and section of the filter box; Fig. 4, the construction of the central manifold cock; and Fig. 5 the mechanism for dumping the boxes.

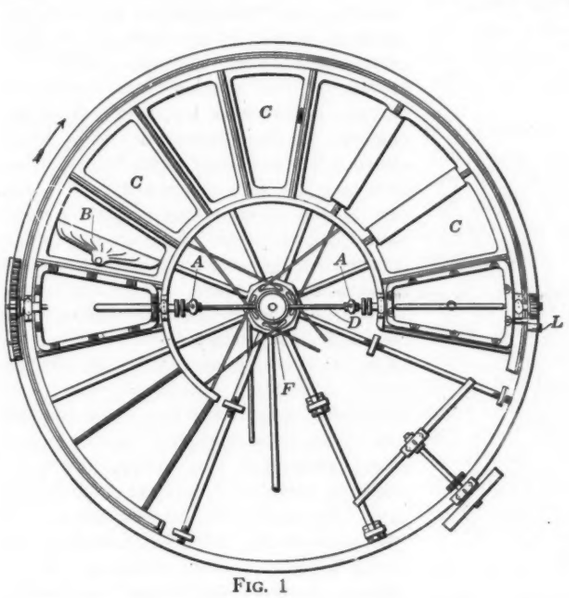

FIG. 1

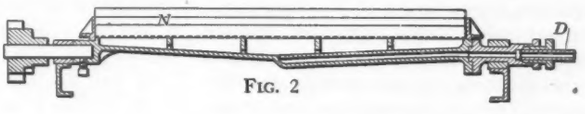

FIG. 2

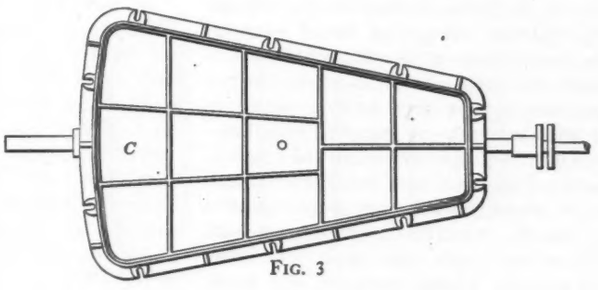

FIG. 3

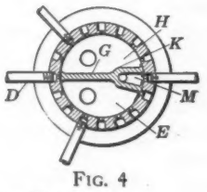

FIG. 4

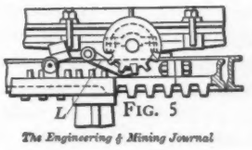

FIG. 5

The Engineering & Mining Journal

DETAILS OF CONTINUOUS FILTER

Details of Operation of the Grothe-Carter Filter

The operation is as follows: The frame is set rotating, and the mixture to be filtered is fed into the distributor *B*, which distributes it over the screen of the first filter box *C* passing underneath. The cock *A* for this box is opened, and suction under the filter cloth begins, the clear solution passing through pipe *D* to a chamber *E* of the central manifold cock *F* and from there to a receiver. All the boxes on the frame successively pass under the distributor and receive their charge, the cock of each box being opened as soon as it has been charged.

When the material in the first box has been sufficiently filtered, the outlet of its discharge pipe *D* into the manifold cock is momentarily closed by the partition *G*, wash water is added, and the outlet moves to chamber *H* of the manifold cock from which the solution is conveyed away. When the washing is completed, pipe *D* is closed by partition *K*, pawl *L* is lifted from its groove by contact with a stop, and a rack engages a pinion with the result that the filter box is turned upside down. As this occurs pipe *D* communicates with chamber *M*, so the suction is removed from the underside of the filter cloth and the material resting upon it drops into a hopper. The box continues its circular course, and by means of the rack and pinion it is restored to its normal position, and moves on to be filled again by the distributor.

The filter box *C* has an upper removable filtering screen or hopper *N* and a lower part which collects the strained liquid and discharges into the pipe *D*. The filtering screen *N* is made up of one or more thicknesses of duck, jute cloth, wire cloth, etc., supported by a wire screen.

A recent ordinance issued by the Papuan Board, according to the *Aust. Min. Stand.*, provides for the payment of a reward, not to exceed £1000, for the discovery of any new goldfield in British New Guinea, provided: (1) That for a period of 18 months within the three years following the report of the discovery, a population of not less than 200 miners of European descent has been employed upon the goldfield. (2) That the goldfield is distant more than 20 miles in a straight line from the nearest place where payable gold has previously been obtained.

Reflections on Some Colliery Explosions

Views of Many Experts Who Concur in the Belief That Rescue Apparatus Should Be Immediately Available at Each and Every Colliery

SPECIAL CORRESPONDENCE

The community in Great Britain are viewing with symptoms of alarm the recurring coal-mine explosions. In August, 1908, the Maypole colliery disaster (Lancashire) claimed 75 victims. Interest throughout the land was sustained for an unusually long period of time due to the mine firing, making it necessary to flood the workings with water; the recovery of the mine commenced on November 5, 1908, and proved a long and tedious operation. The coroner's inquiry into the explosion occupied 23 sittings, and altogether 56 witnesses gave evidence.

In the view of Henry Hall, formerly inspector of mines, and Samuel Pope, barrister-at-law, who reported to the Home Office, the most important aspect of the evidence at the inqury was the apparent lack of any definite line of action to be followed by the firemen and shot-lighters when they found parts of the mine dangerously affected by emissions of firedamp, a condition which must arise from time to time in mines of such a nature as the Maypole, however skilfully the ventilation may be applied. Too much confidence was placed in the shot-firers and they were expected to handle difficulties without constant recourse to their superiors. The difficulties were greater than the shot-firers could successfully grapple with, and it was here, the commissioners thought, that this colliery was deficient in organization. They added: "An important lesson to be learned from the disaster seems to us to be that an endeavor should be made in mines which make firedamp freely, to fix, if practicable, some standard of ventilation, with the object of lessening both the responsibility and discretion of the under officials."

The Value of Complete Records

G. H. Winstanley, the lecturer in mining at the Manchester university, who attended throughout the prolonged Maypole inquiry in an address before the Colliery Managers Association, in Lancaster, said that no one circumstance was more forcibly impressed upon his mind during the inquiry than the importance, the inestimable value of complete and accurate records. He recalled that there are certain statutory books of records to be kept at the mine, and entered up day by day or at other stated periods. The idea that these books are only to be filled up as a matter of form need not be entertained for a moment. The manager may some day find his reputation, perhaps his liberty depends upon those records.

Mr. Winstanley proposed, if there is a possibility of the shot-firers getting into the habit of entering up this report book in a formal sort of a way, that is, if they regard this duty as merely a burdensome detail of routine, that steps should be taken to correct the habit. He told his auditors the statement is so incredible that he hesitated to believe it—of a fireman who could neither read nor write except the one sentence: "Safe and in good order." There can be no possible value in such a report. As to the impression produced upon the minds of a jury to whom such a report was presented with that sentence repeated day after day like lines in a copy book, comment is surely needless.

In February, 1909, the explosion at West Stanley (Durham) was accompanied by the loss of 168 lives. In this case some were disposed to argue that electricity had been a factor in extending the calamity (see p. 1074 Engineering and Mining Journal, May 21, 1910). In connection with the inquiry, D. W. M. Thornton, Professor of Electrical Engineering at Armstrong College, New Castle, thought the most probable cause of the explosion was a short circuit set up by a train of coal dust, and there was in court a junction box from the "Busly West" seam, which box was electrically disemboweled, and that was exactly where two experts (Simon Tate and W. C. Blackett) fixed the explosion.

Short Circuits Caused by Coal Dust

Professor Thornton demonstrated that sparks would pass between carbon dust immersed in oil under pressure of 50 volts, and this, he said, proved that if there was electrical pressure between metal terminals, the carbon dust which collected formed chains, so that the electricity passed easily from the one to the other. Where metal terminals are exposed, dust held in suspension is gradually deposited, and would be sufficient to establish a short circuit. Assuming a short circuit caused by coal dust at the terminals, and a cloud of dust caused by a traveling set, witness concluded it would probably be sufficient to start firing along the roof and perhaps cause an explosion.

In further evidence, the professor said a short circuit might have taken place in a closed distribution box and blown off the cover, causing an explosion if the conditions were just right. He has known boxes with heavy cast-iron cases blown up by no more than a short circuit. It is impossible to construct covers with terminals impervious to dust. A spark produced by friction may fire gas, but he does not think it would fire dust.

The Darran Explosion

The South Wales district was stirred in November, 1910, by the Darran colliery explosion, in which there were 27 deaths, including five members of the rescue party. The outstanding features of this accident calling for attention were: (a) That would-be rescuers contributed nearly 20 per cent. of the death roll; (b) the considerable interval between the time of the explosion and the arrival of properly equipped rescue brigades; (c) the recovery of eight horses alive after the ventilation had been restored; (d) the absence of any record as to the quantity of explosive given out from the store; (e) the divergence of opinion as to whether the mine was really dry and dusty.

The Wellington pit, Whitehaven, Cumberland, was visited by a holocaust on May 11, 1910, the destruction of 136 lives being the result. To the terror of the explosion was added that of a fire, and the mine inspectors and experts reluctantly concluded that rescue operations must be abandoned, and the mine bricked up. At first they merely blocked up the main intake only, but unavailing efforts to get into the workings by the return showed clearly that the quickest way to recover the bodies of the entombed men was to exclude all air from the mine; this was done, but not until the experts had been forced back by intense heat after passing through gas which was succeeded by dense smoke.

More Openings to the Surface

Arising out of this disaster at Whitehaven, there has been considerable discussion and many suggestions have been made with a view of securing greater safety and increasing the prospects of escape in the event of an explosion occurring. It may be recalled that the coal-mines act of 1887 enacts that there must be two separate shafts at least 15 yd. apart, and all the seams worked require direct communication with these shafts. In view of the extent of many mines, it is now suggested there should be more openings to the surface, the scheme embracing a double shaft for every half

mile worked, which would admit of working a square mile of coal. In addition, double roadways are proposed to the pit bottom from every section or district of the mine, one of these roads being narrow, not meant for haulage. It is urged that such a roadway, 6 ft. wide and 5 ft. high, would be little liable to falls, and that iron girders could be used to support the roof and sides, all wood thus being displaced in its maintenance. The expert who advances these proposals admits there would be an additional charge on each ton of coal produced, but naively suggests that everybody would admit that it would be better to pay a penny per ton more for coal than have these disasters.

The awful loss of life at Whitehaven, more than anything else, has directed anew attention to the need for the establishment of rescue stations for mines. In a letter to the *Times*, of London, Lieut.-Col. Henry S. Walker says no practical man can deny that it is quite possible that had the management provided some form of uptodate rescue apparatus at the mine itself, or if a rescue station had been close at hand, the majority of the 136 lives might have been saved, as probably not more than a dozen of the men were killed by the actual explosion. No matter how big a fire may become, it is always small at the start, and had men been able to reach the seat of the fire within, say, half an hour or an hour, it might have been comparatively easy to put it out and restore the ventilation, however bad the atmosphere might temporarily have been, for the heat could not have been so intense at first as it became a few hours later. Colonel Walker speaks from practical experience, for about two years ago a fire broke out in the workings of the Warncliffe-Silkstone colliery, about a mile and a half from the pit bottom. Luckily, in this case the rescue apparatus was at the pit mouth ready for instant use, and men fully equipped were at the seat of the fire within half an hour and were therefore able to get it quickly under control. But without this apparatus they could have done very little, and serious loss of life and capital would have resulted.

Rescue Apparatus Should Be Near at Hand

Colonel Walker may claim the authority of an expert, and he points out that there are several types of rescue appliances on the market that have stood the test of practical work under the most severe conditions. He is unable to understand the slowness of colliery directors and mine managers in adopting one or other of these, and hopes that no more time will be lost and that every district will have its training station where the apparatus can be kept in order and repaired, and where men can be trained. In addition there should be three or four sets of apparatus at each pit, which should be constantly changed from the central station so that they may always be in perfect order ready for use. There is little doubt that if these stations were generally adopted throughout the mining districts, daily use would suggest many improvements in detail, with the result that the various appliances would become more perfect and practical. Another point is that a man coming from a distance to undertake rescue work is not only handicapped by loss of time, but the mine and system of working is unknown, and it is impossible for him to do such effective work as the man who is at home and knows the mine where the accident may take place.

At the coal mines in the German Empire, in Austria, France, Belgium, Holland and Russia, it is obligatory to provide breathing apparatus to the mines. In Great Britain and the United States, however, there are no definite regulations, although in the latter country it is true that the mine accidents division of the Technological Branch of the United States Geological Survey has officially taken up the question with a scheme for the erection of 13 stations, four of which are already in operation.

It is significant that in Great Britain, where so very much has in different directions been accomplished in the way of legislative enactments, the government authorities are behind all the other great coal-producing countries of the world so far as definite action is concerned. There is not a single official rescue station in the country, the Government relying upon the munificence of the colliery owners, who, to their credit be it said, now have stations at Wath, Altofts and Tankersley, in Yorkshire; Atherton, in Lancashire; the Elswick Works, Newcastle, for Northumberland and Durham, and Aberaman and Crumlin in South Wales. In the latter district 11 more stations are under contemplation, while East Scotland will shortly be served by a rescue station at Cowdenbeath, in addition a station is being organized in conjunction with the experimental mine at Birmingham University.

The British Royal Commission on Mines, in their first report issued in 1907, expressed the view that the question was ripe for further development, but their conclusion was that sufficient advance had not been made to justify a recommendation making the provision of breathing apparatus compulsory. They were therefore content to urge mineowners to take steps toward this introduction. They were more definite in their 1909 report, but even after the accumulation of evidence, they left the provision of appliances to private munificence. What they did say was: "We have come to the conclusion that the provision and use of breathing apparatus should be general throughout the country, and that every mine should either be provided with a properly trained brigade of its own, which appears to us to be the best arrangement, or have the right to call for a sufficient number of equipped and trained men from a rescue station. The latter arrangement, it would appear from the experience at Whitehaven, is not likely to prove successful. To be really successful, the apparatus must be on the spot, with the men trained and ready to undertake the work of rescue with the least possible delay.

A Proposed Rescue System

H. C. Jenkins, the managing director of the Mining Engineering Company, Ltd., Sheffield, Yorkshire, the makers of the "Meco" breathing apparatus, which was worn by the men who tried to pierce the workings at the Wellington pit 30 hours after the explosion occurred, has been discussing feasible schemes for the establishment of rescue stations. He suggests two ways, one being a central station and head office for training and examining the men when qualified, connected with a number of substations in each colliery center, all connected by telephone, so that the men from the substations might be rapidly brought upon the scene of a disaster and work in shifts of two hours each, which would be quite as much as they could do in poisonous fumes. The other scheme would be one central station with three or four substations and the equipment of every colliery with one set of apparatus for every 200 men working, all ready to use, and no fewer than three apparatus at every pit. The telephone would again be utilized, and local men could act as guides to the rescue parties.

As to the expense, Mr. Jenkins thinks the colliery owners should pay *pro rata* to the number of men they employ. It is advisable that the trained men should be volunteers, and that they be paid while training just as if they were at work underground; should an accident happen, they should be called out for duty and paid a minimum payment of $5.

Make-up of a Rescue Party

Each rescue party ought to consist of five men—a leader, who should be an official, carrying nothing, but directing operations and being responsible for the whole party, two miners with picks and tools, one fitter, with suitable wrenches, hammer and chisel, and one laborer, carrying crowbars, axes. etc.

The leader should have a helmet, so that he could talk with the men, but the men should have mouthpieces without helmets. These would be lighter, but would not permit conversation. In the event of one being injured or overcome, the other four could easily carry him out. This in brief is the composition of the rescue parties favored by Mr. Jenkins.

Foreign Labor in the Pennsylvania Coalfields

Laborers in Bituminous Fields Are Recent Foreign Immigrants, Who Were Agriculturalists Abroad. Employment Not Steady, Wages Low

WASHINGTON CORRESPONDENCE

The Immigration Commission has made public the second part of its report on "Immigrants in the Bituminous-Coal Industry," prepared under the direction of W. Jett Lauck, superintendent of agents. Part 1 of this report was presented to the Senate before the adjournment of Congress by Senator Dillingham, chairman of the commission. The section now made public deals entirely with conditions in the Pennsylvania field, although it is prepared substantially after the same plan as the preceding section.

Fully 75 Per Cent. of Workers Are Foreign Born

Conditions in the Pennsylvania field were studied in connection with returns for 1340 households, covering a total of 8871 persons, and returns for 49,137 individual male workers employed in the bituminous mines. Of the 1340 households, about 97.5 per cent. were foreign born, while of the individual mine workers, 75 per cent. were foreign born. This enormous mass of foreign labor, far greater in proportion than that exhibited in the other bituminous fields, was drawn into Pennsylvania partly because of the extraordinary increase in production which called for additional labor.

Although the majority of the employees after 1870 were of foreign birth, employment of immigrants from southern and eastern Europe did not begin until about 1880, when the Slovaks began to arrive, followed by the Magyars and Poles and, later, by the Italians, Croatians, Servians, Russians and other southern European races.

At the present time the mining community in the Pennsylvania field is composed chiefly of the foreign born who have been in the United States only a short time. Of the 37,016 individuals studied, 40 per cent. had been in the United States less than 5 years, and 29 per cent. less than 10 years. The foreigners, moreover, were not miners abroad but were in most instances farmers or farm laborers, nearly three-fifths belonging to the latter class in a group of 1741 individuals selected for special study.

Accidents Largely Confined to Those Having No Mining Experience Abroad

The races vary somewhat in the percentage of farmers and farm laborers, the Russians reporting over 92 per cent. as having been engaged in that occupation. Practically none of the southern Europeans had been miners abroad. This condition undoubtedly has had its effect in enlarging the proportion of mine accidents, and the commission shows, by data drawn from State investigations and elsewhere in conjunction with its own figures for racial distribution, that accidents were probably more numerous in those regions where the inexperienced immigrants were found.

The study of daily earnings shows that few persons of any race earned less than $1.25 per day; of the native born 95.7 per cent. and of the foreign born 92 per cent. earned $1.50 or over per day. There were only 29.5 per cent. of the native born and 19.9 per cent. of the foreign born earning $2.50 or over. The annual earnings of 1214 male heads of families who reported shows that, for 1188 who reported full details and who were foreign born, the average annual earnings were $427, while 26 heads of families, native born of native father, reported an average annual earning of $586. Of the foreign born in this group, 47.9 per cent. received less than $400 a year, as against 15.4 per cent. of the native whites. Only 15.7 per cent. of the foreign born earned over $600.

The English, German and Irish heads of families consecutively averaged more in annual earnings than did the other immigrant races, though their earnings were not as high as those of the native whites. A study of annual family incomes shows that, of 1223 families, 49.8 per cent. had less than $500 per year total income. The income of the American families was 41.8 per cent. greater than the average income of the immigrant families. Some family incomes fell exceedingly low, for 23.1 per cent. of the Ruthenians received an income between $300 and $500 per year, and only 2.6 per cent. of that race had a family income in excess of $750 per year.

Foreigners Tend to Segregate into Boarding Groups in Order to Live Cheaply

The wives of the miners added to the earnings of husbands by taking boarders, as there were few, if any, other opportunities for work for women except in a limited number of cases where cities were in the neighborhood. The figures show that the necessity of adding to the income of the husband led to very great congestion among the various immigrant races and in some instances destroyed the possibility of separate family life owing to the existence of boarding groups which required almost the whole attention of the wife. The necessity of adding to the earnings of heads of families can be better understood from the fact that the miners were practically unable to do anything outside of their daily labor, the usual hours being 10 per day, 6 days in the week, while occasionally inside work called for 7 days per week, the hours sometimes running as high as 12 per shift.

In the unionized districts of western Pennsylvania, however, the standard hours were 8 per day and 48 per week. Wages, moreover, were not free of deductions, but upon the semi-monthly pay day, subtractions were made covering the workman's purchases at the company store, and for rent of the company house furnished him to live in. While purchases at the company store were not absolutely compulsory, there were some instances where they practically were so, while in others it was necessary to buy certain goods, such as powder and explosives, at the store. Some stores were conducted upon an equitable plan with reasonable prices and the goods of fair quality, while others charged exorbitant rates and sold inferior goods.

Employment was found to be irregular. Of the native-born persons, only 22.9 per cent. worked 12 months in the year, and only 63.2 per cent. had work for nine months or over. Of the foreign born, 20.5 per cent. worked 12 months, and 59.3 per cent. six months.

Recent Immigrants Less Amenable to Union Control

The variations in employment between the different races were somewhat noticeable; certain races being preferred when men were to be boarded, while occasionally it appeared that the men who spent their wages most freely at the company store were more likely to be retained in the event of a shutdown. It was found that recent immigrants were less amenable to the control of union labor than natives or northern European immigrants, so that in some sections a prejudice has grown up against them among the older employees.

The housing and living conditions in the mining communities varied somewhat from place to place, but conformed to the general uniform type. The companies supplied houses at a rental which returned them a handsome income on the investment. Congestion was brought to

an acute point in many places through the establishment of boarding groups, which were both housed and fed in the small company houses. Owing to their reluctance to entertain large groups of boarders, the native families paid the highest average rent per apartment, per room and per capita.

Migratory Instinct of Foreigners Constantly Changes Status of Labor Market

Under such conditions of living, standards of efficiency were naturally not high, but it was found that the recent immigrants were more passive and submissive and less ambitious and enterprising than older immigrants and natives. Opinions of employers varied so widely that nothing definite could be concluded as to the relative merits of the different races. Americans or northern Europeans were employed for most of the administrative positions, while the routine work was done by foreigners, mostly of southern European origin, the order of preference in some cases being as follows: Magyars, Poles, Slovaks and South Italians.

The migratory instinct of the immigrants tends to give a fluctuating character to the labor supply, the men moving rapidly from the mine to mine and frequently visiting abroad when work is slack. About one-fifth of all immigrants were found to make visits abroad.

A high rate of illiteracy prevailed among most of the recent immigrants. Of 48,747 employees, 85.2 per cent. were able to read, and 83.5 per cent. were able to read and write, while among some foreign-born races, such as the Bulgarians, only 43.3 per cent. could read, and 36.7 per cent. could read and write. The northern European immigrants were far superior to the southern Europeans in this regard, some reporting 100 per cent. of their number able to read and write. Information obtained from 43,798 males show that 56.5 per cent. were single, the native and foreign-born being substantially of an equality in this regard.

Foreigners Exhibit Little Civic Interest in Local or National Affairs

Among the influences tendng to retard assimilation and the assumption of a stable form of family life were the difficulties in the way of home ownership, due to the fact that mining companies would not sell their houses. Of 1358 families, only 9.2 per cent. owned their own homes. Little real or intelligent civic interest was manifested by recent immigrants, the Bohemians and Moravians being, perhaps, more ambitious to share in politics than any other foreign-born race group. Of 12,182 immigrants who could be naturalized citizens if they so desired, only 22.1 per cent. had availed themselves of the opportunity, while 10.3 per cent. had taken out their first papers.

The report on the Pennsylvania field closes with a detailed study of representative bituminous mining localities in western Pennsylvania. The method there adopted is that of a specific study of mining communities undertaken for the purpose of checking the general results which had been obtained through a study of numerous communities. The community studies bear out in a general way the conclusions already arrived at in the general study of the Pennsylvania field.

Coal Mining in a Vertical Seam

By Henry M. Payne*

The geological structure of the Hosmer field is most unique. Mt. Hosmer is an up-thrust of the Devonian limestone, through the coal beds of the Cretaceous, and the effect has been to throw the 10 seams of coal on the east side of the Elk river, into pitches varying from 12 to 55 deg. The Hosmer Mines, Ltd., in opening up their property at Hosmer, on the Canadian Pacific Railway, about 30 miles west of Crow's Nest Pass, and 7 miles east of Fernie, drove a 5200-ft. tunnel transversely through these measures, as indicated in Fig. 2.

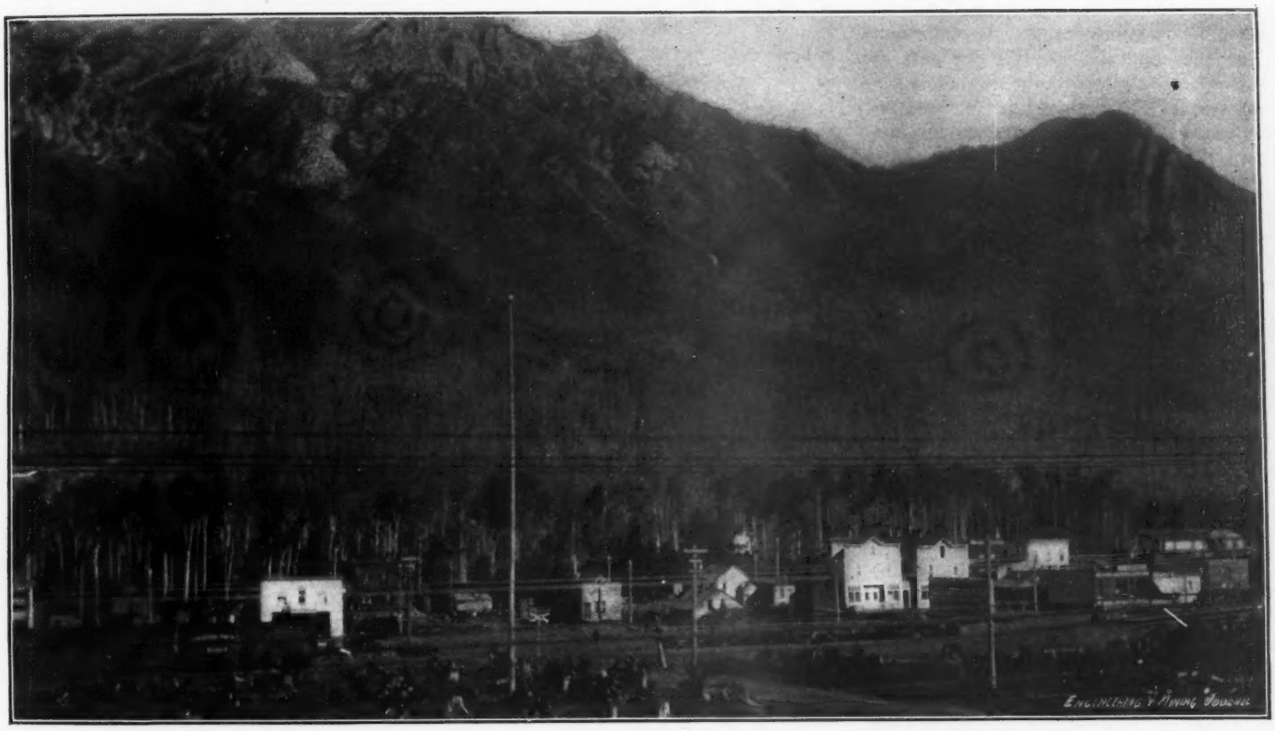

Fig. 1. General View of Hosmer, British Columbia, and Mount Hosmer in Background

After passing through 1200 ft. of Fernie (Benton) shales, and 200 ft. of sandstone, No. 1 seam was encountered, and thereafter at intervals averaging 400 ft. the succeeding seams up to No. 10, beyond which lies 200 ft. of conglomerate rock. These seams vary from 4 to 40 ft. in thickness, with a cover of approximately 2000 ft. above the tunnel. Refer-

*Consulting mining engineer, Morgantown, W. Va.

ence to Fig. 2 shows the mountain on the east side of the creek to be a table land.

The photograph, Fig. 1, was taken from the company office at the mines, looking west, toward Mt. Hosmer, and at the extreme right of this picture the uplifted strata in nearly vertical position, are plainly visible.

METHOD OF DEVELOPMENT

From the tunnel, cross entries are driven right and left, on the strike line, in each seam. At intervals of 250 to 300 ft., chutes are driven directly up the pitch, for about 400 ft. From these chutes, alternately right and left, rooms are turned on the level and parallel to the cross entry below. The coal from these rooms is brought in small ore cars by hand to the chute and dumped, whence it passes down by gravity to the cross entry below, the bottom of each chute forming a bin, out of which the cars are loaded and hauled to the tunnel, where compressed-air locomotives pick up the train and haul it to the mouth of the tunnel. Here the entire trip is let down the mountain on a splendidly equipped plane

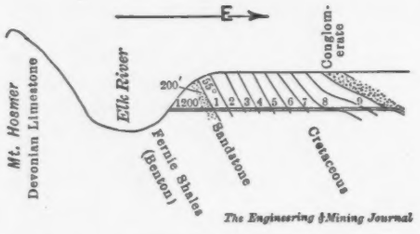

FIG. 2. SHOWING TUNNEL DRIVEN THROUGH COAL MEASURES

exceeding 4000 ft. in length, to the tipple.

As the development of the mines requires, additional cross entries will be turned at succeeding levels of 500 ft. until ultimately there will be 4 levels in simultaneous operation, and the company expects to recover a high percentage of the coal on the property.

In addition to the regular domestic trade, the company also supplies the coaling station of the Canadian Pacific Railway and operates a large washery and coke ovens.

I am indebted to General Manager Lewis Stockett and Superintendent D. S. Wilson, of the company, for many courtesies and much information during my visit at the mine.

The condition in the coalfields of Alaska in 1909, as reported by the U. S. Geological Survey, shows no industrial advance, and in some regions there was decided retrogression. The long delay in the issuance of patents to coal lands and the popular clamor against all Alaskan coal claimants have discouraged claimants and investors.

Report on Immigrants Engaged in Bituminous Mining

WASHINGTON CORRESPONDENCE

The Immigration Commission has made public a third section of the report on immigrants engaged in bituminous coal mining. This new section of the report relates exclusively to the field in the Middle West, including Ohio, Indiana, and Illinois. Of 9331 mine workers who were studied, it was found that 57 per cent. had been in this country less thar 10 years, and more than one-fourth less than five years. The investigation shows that not only was there a much larger percentage of native and Northern European immigrants in the Middle West than were in Pennsylvania, but that a larger percentage of the men who reported had been miners abroad. Nevertheless, the majority of all miners reporting had, as in Pennsylvania, been farmers or foreign laborers. The daily earnings of male heads of households in the Middle Western field were found to be $1.25 or over per day in the case of 96.1 per cent. of all the employees investigated. Of the native-born, 95.9 per cent. earned $1.25 a day or over, 87.9 per cent. earned $2 or over, and 63.2 per cent., $2.50 a day or over. Only 10.7 per cent. earned $3.50 a day or over.

An inquiry into the annual earnings of the heads of 163 families shows that $472 was the general average. A study of aggregate earnings of families shows that the wives of employees in a considerable number of instances added to the family income. The contribution of children in some instances made available additional sources of revenue.

THE MACHINE SYSTEM OF MINING

The report of the commission notes the tendency to introduce the machine system of mining in place of hand or pick mining. This machine system operates strongly to enable immigrants to supersede the native American miner. While the immigrants, in conjunction with the use of machine methods of mining, have rendered possible the rapid expansion in the output of coal, the conclusion is reached that wages have, nevertheless, increased in a material degree, although the earnings per day in the hand mine are now considerably more than in the machine mine. The recent immigrants, however, are tending to drive out the older mine workers, and only by the use of labor organizations has this process of displacement been in part counteracted. As the older miners are displaced, they have tended to drift to other coalfields, although many have left the industry entirely. It was also shown that the average American household has fewer persons than the average immigrant household. Only a comparatively small number of households have distinct rooms set apart for living, cooking and the eating of meals.

THE WESTERN MINER MORE INTELLIGENT

The literacy of the miners in the Middle West were found to be somewhat better than in the East. It appeared that 92.6 per cent. of the miners could read, and 91 per cent. could both read and write. Of the natives 96.8 per cent. could read and write. About 85.4 per cent. of the foreign-born miners could both read and write. Of the foreign-born females only 60 per cent. could read the English language. It appeared that only 44 per cent. of the foreign-born employees were naturalized, while 18.9 per cent. had first papers only, and 37.1 per cent. had neither first nor second papers.

The West Virginia Coal Industry in 1909

SPECIAL CORRESPONDENCE

From the 713 producing mines operated by 391 firms, together with the small country mines, the coal produced during the fiscal year 1909 was 46,697,017 short tons; this output shows an increase over the previous year of 2,326,756 tons. The total production of coke was 3,125,451 short tons, an increase of 147,188 tons over the previous year. The total value of the coal sold was $34,480,134; the total value of the coke produced was $5,577,276. The coal mines of West Virginia in 1909 gave employment to approximately 58,000 men. The average production per man for the year was 750 short tons. There were about 1600 machines in use, of which number 625 were pick machines. The year was especially free from serious disasters. The supply of coal still available in West Virginia, allowing for a fair increase in the rate of mining, will last about 2000 years.

COLLIERY NOTES

It is possible to burn coal containing up to 5 per cent. of sulphur without great difficulty from clinkers. A little steam introduced under the grate will relieve much of the trouble. Clinker may be due to other causes than sulphur, as any constituents of the ash which are easily fusible may produce it.

About one-half of the known tonnage of Alaska coal is lignite; a little over one-fifth is anthracite and high-grade bituminous coal, and the rest falls into the bituminous and subbituminous classes. It is fair to assume that these ratios will hold for the coals of the areas on which no tonnage estimates are possible.

Annual Report of El Oro

The report of A. F. Main, general manager of the El Oro Mining and Railway Company, Ltd., for the year ended June 30, 1910, contains interesting information as to the company's operations. The total ore mined in the year was 317,824 tons, an excess of 29,247 tons over that mined during the previous year. The northern and southern orebodies of the San Rafael vein were as usual the largest producers, being credited with 114,841 and 113,401 tons respectively. The following tonnages were mined from the different levels: San Juan, 47,368; 86-ft., 18,873; 186-ft., 79,430; 286-ft., 60,707; 386-ft., 16,881; 486-ft., 4722; 900-, 1000- and 1150-ft. levels, 24,391; 1st, 2d and 3d, 64,649; 100- and 340-ft. levels, 533; total, 317,824 tons.

Much Sinking Done

Besides a great amount of drift work, much shaft sinking was accomplished during the year. The new shaft at the northern end of the property connected with the 1000-ft. level in January, and in consequence ventilation and economical working of the mine have been greatly facilitated. The Somera shaft reached the 1300-ft. level. The incline, or main hoisting shaft, has connected with the 1000-ft. level, and the upper portion from the San Juan down to the 486-ft. level was completely retimbered without curtailment of the monthly tonnage of ore sent to the mill. The new inclined portion of the south shaft, from the San Rafael level to the surface, was completed. The San Patricio shaft has been sunk 100 ft. below the fourth level.

Large Ore Reserves Proved

As a result of development work on the various orebodies of the mine, the following ore reserves have been blocked out: Northern orebody, 87,098 tons, averaging $6.15 per ton; southern orebody, 156,348 tons, $6.34; total, 243,446 tons, averaging $6.27 per ton; lower levels, 57,616 tons, $18.09; San Patricio, 138,577 tons, $7.02; Descubridora vein, 2000 tons, $10; grand total, 441,639 tons, averaging $8.06 per ton in gold, to which should be added 3 oz. silver per ton.

Creditable Results from Mill and Cyanide Departments

During the first two months of the year, interruptions in the electric-power service caused the milling plant to operate somewhat intermittently, but from that time on, it had a continuous run, crushing 316,138 tons of ore, and yielding bullion to the value of $2,562,705. The addition of three tube mills, together with minor changes, made it possible to close down the No. 1 mill, and at the end of the year about 1000 tons per day were being crushed to slime in the No. 2 mill. The tons crushed per stamp per 24 hours rose from about four tons in July, 1908, to 10.33 in June, 1910. The results for the year are set forth in the following statement: Tons crushed, 316,138; assay value of ore, $7.29 in gold, $1.57 in silver; theoretical extraction: Gold, 92.80; silver, 76.20; total, 80.86 per cent.

Working Costs Reduced

The average cost per ton showed a decrease as compared with that of the previous year, in spite of the fact that the expenditure on development was nearly $100,000 more. The average cost per ton for the last quarter of the year was $3.87; the average for the entire year, $4.93. Total costs per ton were: Mining, $2.25; development, $0.94; milling, $0.28; cyaniding, $0.87; water supply, $0.01; general expenses, $0.25; taxes, $0.33; total, $4.93 per ton. The total bullion realized for the year was: Gold, $2,171,744; silver, $390,931; total, $2,562,705; total cost, $1,557,889, leaving a profit of $1,004,816 from the mining department.

Railway and Lumber Department Shows Increased Profit

The net profits for the year for the railway and lumber department was $124,254, the largest figure yet realized. Prominent factors in this increase profit were additional freight receipts from shipments made by the Suchi Timber Company, Ltd., the large amount of wood hauled during the electric-power shortage and the decreased operating expenses. Receipts were: General-merchandise freights, 463,425 pesos; passenger receipts, 34,020; express receipts, 11,032; telegraph receipts, 425; miscellaneous, 5178; total, 514,083 pesos. The expenses were 306,800 pesos, showing a profit of 207,282 pesos. Adding to this 41,226 pesos profit on wood and lumber makes a total profit of 248,509 pesos for the year.

New Installations Made

Among the new installations of the year were: A 200-h.p. electric hoist and the various buildings necessary to the surface plant at the new ventilation shaft; the south-shaft hoist was changed from steam to electric power and new ore bins provided; a plant for creosoting all shaft timbers; a change room near the Somera shaft; an ore bin for the storage of tube-mill rocks at mill No. 2; three new tube mills and three tanks at the cyanide plant; six Burt revolving filter presses; a new transformer house in mill No. 2 and other electric equipment; and three new cottages for the use of employees. In concluding his report, Mr. Main acknowledges his appreciation of the support he received from his staff and in particular from his assistant manager, Frank Jenkin.

Salt Industry in France

The most important of the salt industries in France are those in the department of Meurte-et-Moselle on the eastern border, according to the *Journ.* Soc. Chem. Ind., July 30, 1910. In most of these works borings are made. The largest works are those of Rosières-Varangéville, where the salt is obtained by blasting in a shaft 120 m. deep. The rock salt is of a light gray or red color, and, being exceptionally pure, is in demand for the soda industry. The works also produce salt by Cantenot's process, which consists in passing through a tower of tiles, a blast of hot air derived from the fire gases. Coming in contact with the finely divided brine, it yields a fine deposit of salt which is used for table purposes.

The best known sea-salt works are the Peccais plant in Gard, with an acreage of 6138, yielding an average of 6.4 to 6.8 tons per acre. The most importance works are those of the Compagnie des Produits Chimique d'Alais et de la Camargue at the mouth of the Rhone. The works of Giraud now employ the vacuum apparatus of the Schweizerhalle works, and work up the excess of salt into ammonia-soda. Magnesium and potassium chlorides are also produced in these works. The potassium chloride found in the form of carnellite is utilized in agriculture, while a part of it is manufactured in Salindres into potassium chlorate.

Other Salt Fields in France of Lesser Importance

The salt works of the French Mediterranean produce only a small amount and are of relatively small importance. In the Southern salt works from 12.1 to 23.7 tons per acre are obtained, while in Corsica the corresponding yield is 68.5 tons. Since 1865 the business of these works has been in the hands of a syndicate. The Western salt works on the coast of the Atlantic extend over a number of departments, but their output does not compare favorably with that of the Southern works, in spite of the advantage they possess in having the sea water raised by the flow of the tide instead of by pumping.

The yield of salt per acre in the Atlantic field is about from 0.6 to 11.1 tons per acre. The chief towns for the export of salt are Marseilles and Cette, the port trade being principally with Switzerland, Algiers and Madagascar.

On July 14, a shipment of 350 tons of steel bars was received at Seattle, Wash., this being the first shipment of steel to reach Seattle from the Western Steel Corporation's new steel mills at Irondale, Puget sound, Wash. It was also the first commercial order received by the mills.

PERSONAL

Mining and metallurgical engineers are invited to keep THE ENGINEERING AND MINING JOURNAL informed of their movements and appointments.

J. B. Farish, of Denver, Colo., is in Nevada making some mine examinations.

R. B. Lamb has been visiting the Ohio-Keating mine at Radersburg, Montana.

John H. Banks, of Ricketts & Banks, New York, leaves this week for Idaho on professional business.

Ross B. Hoffman, Oakland, Cal., was in British Columbia recently and went thence to Denver, Colo.

James A. Snedeker announces the removal of his office to 818-819 First National Bank building, Denver, Colo.

H. Mortimer-Lamb, secretary of the Canadian Mining Institute, has returned to Montreal from Düsseldorf, Germany.

H. L. Hollis and Potter Palmer, Jr., of Chicago, recently visited El Promontorio mine at Cusihuiriachic, Chihuahua, Mexico.

Richard D. Montgomery has taken a position as field superintendent for the Extension Oil Company, operating near Maricopa, Cal.

John H. McIntosh, recently of Ouray, Colo., has been appointed manager of the Bradshaw & Arizona Mining Company, at Round Valley, Arizona.

Sir Weatman Pearson, of London, well known for his oil operations in Mexico, has been raised to the English peerage, with the title of Lord Cowdray.

James MacNaughton, general manager of the Calumet & Hecla and subsidiary companies, has returned to the property after a short visit at the Eastern office.

Robert S. Botsford has been appointed manager of the Brazilian Development Syndicate, Ltd., with headquarters at Mina Aurora, Lauras, Rio Grande do Sul, Brazil.

E. Frank Atkinson, of William Jessop & Sons, Ltd., Sheffield, England, steel manufacturers, has left Mexico for New York and Sheffield, after a prolonged stay in the Republic.

Lawrence May, mining engineer for the Bully Hill Copper Mining and Smelting Company, of Winthrop, Cal., was in New York recently on a short business trip.

Howard G. Wright, formerly mill superintendent of the Keweenaw Copper Company, has returned from Joplin, Mo., where he has been connected with one of the zinc plants.

H. W. Laws has been appointed general mining manager in London and Nigeria for the Niger Company, Ltd. His English address is Surrey House, Victoria Embankment, W.C., London.

W. L. Kluttz has been appointed general superintendent of the Thomas division of the Republic Iron and Steel Company, Southern district, taking the place of J. E. Johnson, Jr., resigned.

E. T. Adams has resigned as chief engineer and manager of the gas and mill engine department of the Allis-Chalmers Company, West Allis, Wis., a position which he has held for the past five years.

Edward W. Berry, associate in paleobotany of the John Hopkins university, has recently been appointed a geologist on the U. S. Geological Survey and will spend the autumn in paleobotanical collecting in the South.

Professor Hardwick, of the mines department of the University of Sheffield, England, has been visiting mines in British Columbia, including the Western Fuel Company's coal mines in the vicinity of Nanaimo, Vancouver Island.

Andrew Bryden, for years superintendent of the Dunsmuirs' Extension colliery, on Vancouver island, B. C., has been appointed superintendent for the Coal Hill syndicate, to open new coal mines in Nicola Valley, British Columbia.

William Q. Ranft has changed his address from Boston to No. 30 Church street, New York. The Boston offices of the Robert Emmet Copper Company, of Montana, and the Iron Mountain Tunnel Company have been removed to the same address.

Howard H. Cook, who has been appointed assistant secretary of the American Iron and Steel Institute, in charge of the institute's newly opened headquarters at 30 Church street, New York, has been connected for the past three years with the Bureau of Corporations at Washington.

C. F. Buck, who has been associated for a number of years with the American Smelting and Refining Company as designing and construction engineer, has recently opened an office as consulting engineer at 416 Newhouse building, Salt Lake City, Utah. He has recently returned from a professional trip to Montana.

OBITUARY

Charles A. Burnes, formerly interested in silver mining in Aspen, Colo., died on Aug. 22 at the Hotel Navarre, New York.

Frank Smith died at Alta, Cal., Aug. 8, aged 38 years. He was for several years engaged in mining on the Mother lode in California, and more recently spent several years mining in Alaska and the Yukon.

Ambrose I. Harrison died at Brooklyn, N. Y., Aug. 24, aged 49 years. He was chiefly engaged in the local steamboat business, but was also interested in mining. He was president of the Cupric Mines Company and the Horn Silver Mining Company, and a director in several other companies.

Samuel Richard Peale died recently at Lock Haven, Penn., aged 79 years. He was born at Hughesville, Pa., but had lived at Lock Haven for 54 years. He began life as a lawyer. In 1876 he was elected to the State Senate from the Clinton-Center-Clearfield district and served one term. In 1881 he began purchasing coal lands in Clearfield county and the following year bought many thousands of acres on Moshannon creek, near Kylertown. Later he interested with himself in his coal-land transactions John G. Reading, of Philadelphia, and William A. Wallace, of Clearfield. The late William H. Vanderbilt was led to purchase a half interest in the lands and also, by the building of the Beech Creek railroad, to open up the new Clearfield bituminous coalfields. Mr. Peale was the general solicitor of the road from 1882 to 1895 and had charge of the purchase of the right-of-way. He was instrumental in organizing large and prosperous coal companies affiliated with the New York Central interests.

SOCIETIES and TECHNICAL SCHOOLS

American Iron and Steel Institute—The first formal meeting will be held in New York in October. Invitations to attend have been sent to leading representatives of the iron and steel industries in European countries and acceptances have already been received from a considerable number. The sessions will open at the Waldorf-Astoria, Oct. 14. On the same day there will be an afternoon session, and the entire day will be devoted to the address of President E. H. Gary and the reading of papers. In the evening there will be a banquet at the Waldorf-Astoria. For Saturday, Oct. 15, an excursion around New York harbor has been planned. Various railroad terminals and important industries will be visited. The stated meeting will be followed by an excursion, which will probably be by special train. Leaving New York Oct. 16, at 8 p.m., the party will arrive in Buffalo Monday morning, where the works of the Lackawanna Steel Company will be visited. A trip will also be made to Niagara Falls. Leaving Buffalo Oct. 17, the train will arrive in Chicago the next morning. Tuesday and Wednesday will be spent in visiting the Gary works and other plants in the Chicago district. Pittsburg will be reached Thursday morning, and Friday and Saturday will be spent in that district. From Pittsburg the party will take train Friday evening for Washington, and the trip will terminate in New York Oct. 23. Among those who will prepare papers for the meeting are J. A. Farrell, president of the United States Steel Products Company; Willis L. King, vice-president of the Jones & Laughlin Steel Company, and Charles Kirchhoff.

EDITORIAL CORRESPONDENCE

Reports From Our Own Representatives on Important Events From Many Important Mining Centers of the World

San Francisco

Aug. 29—The largest gold dredge yet designed has been started on the Yuba river for the Yuba Consolidated Goldfields. The boat is two feet longer than No. 8 dredge of the Natomas Consolidated of California, which is 150 ft. long. The buckets are to have a capacity the same as those on Natoma No. 8, which is 13½ cu. ft. each. The new Yuba River boat is to be known as Yuba No. 13. The machinery to be placed in the hull is being built at the shops of the Yuba Construction Company at Marysville.

The South San Francisco Land and Improvement Company has brought suit against the Selby Smelting and Lead Company for $1,730,411 damages because the latter company did not build a smelting plant near San Bruno point on San Francisco Bay after having agreed to do so. The plaintiffs, who own a townsite near San Bruno Point and sold the Selby certain lands at a reduced price with the understanding that a large plant would be built, with deep ship channel, docks, etc. The land company charges that because the smelting company did not carry out the agreement and build the proposed plant it is damaged to the amount stated. The fact is that the Selby company started to build its plant at the point designated but found such active and strong antagonism from neighboring communities that the whole plan had to be given up. In fact the supervisors of the county passed an ordinance having such severe restrictions that no smeltery could be operated and comply with the law. The smelting company spent a large amount of money in preliminary work before they became convinced that it could not operate at San Bruno point. There was much opposition to the plan not only from San Mateo and San Francisco counties, but also from counties on the opposite shore of the bay. Therefore the entire plan was given up at a considerable loss to the Selby company.

Denver

Aug. 29—A meeting of the Colorado chapter of the American Mining Congress, Aug. 27, in Denver, considered the conservation policy of the Federal Government, as applied to the mining interests of the State, and more particularly protested against the Nelson bill No. 5486, which provides that all mining claims can be condemned by the Secretary of the Interior for water-power sites, if in his judgment such claims are worth more for power sites than as mining claims. While patented claims are not mentioned, it is believed that there can be little doubt that the courts can hold the language as covering patented mining claims, also in which case no mining claim in a gulch or on a lower hillside would have any security of title. The mining men are not opposed to the general policy of conservation, but in respect of their particular industry, which until lately has been the chief one of Colorado, they feel that the policy as pursued during the last two or three years, and as now outlined for the future, is simply an attempt to deprive them of their inalienable rights, and one that has, and will, put a stop to all prospecting and locating claims until the prospector and miner are guaranteed their rights under the mining laws, whenever he enters the reserves, which now cover nearly every mining district in the State. As Edward F. Browne points out, residents of Pennsylvania, Ohio, West Virginia, Indiana, Illinois and Iowa became wealthy through the coal resources obtained through their direct ancestry or personal selections, and he writes: "Is it fair that the residents of these States should now deprive the Western States of the same chance to enrich their citizens, and create prosperous tax-paying communities, which they enjoyed?"

The formal opening of the Cripple Creek deep-drainage tunnel has been postponed indefinitely, and Colonel Roosevelt will not attend. It is now stated that the heading is 1200 ft. from the main water course, which will take three months or more to complete, and it is uncertain whether the formal opening will be held then, or sooner, when the connection is made with the churn-drill hole of the El Paso mine, on Beacon hill. At the El Paso shaft the tunnel will be 1288 ft. below the surface, and if continued on its course to the Elkton mine, it will be 1640 ft. beneath the surface.

The Kuenzel smeltery, at Buena Vista, after running 18 days, has closed down for some alterations in the plant, which have been found necessary.

An important event to the mine operators of the State is the finishing of the hydroelectric system of the Central Colorado Power Company, which is marked by the completion of the Boulder plant.

Two important strikes recently made in San Juan county establish the fact that the Red Mountain deposits are in a zone continuous over Red mountain and down along the Cement Creek side, and that the ores of San Juan county are found at depth. In the Kansas City group in Georgia gulch a rich body of copper ore has been encountered. Three feet of solid ore is exposed in the breast of the drift, 85 ft. from surface and at a depth of 70 ft. This ore will carry from 40 to 1800 oz. of silver. It is identical in appearance with the rich ore from the Yankee Girl mine. Twenty tons of this rich ore is being loaded today at the Henrietta for shipment to Durango. The property is owned by Walker & Russ, who have worked it for two years. Farther up the hill on the outcrop of the dike reddish zinc ore has been encountered which answers the description of the zinc cap encountered on the Yankee Girl and Guston mines. It runs 20 to 40 oz. in silver. The Hamlet mine, six miles from Silverton on the Silverton Northern railroad, has made a strike of 4 ft. of high-grade copper ore on the sixth level. The ore runs 12 per cent. copper and as high as 40 oz. silver. This gives the Hamlet a stoping hight of 1300 ft. above the sixth level, with no stoping done below the fourth level, and practically the same character of ore throughout, overthrowing the theory that ore does not exist at depth in the San Juan veins.

Butte

Aug. 27—The Butte-Ballaklava Copper Company, against whom the Anaconda Copper Mining Company has recently brought suit for $1,880,000 damages for ore alleged to have been wrongfully taken from the Anaconda company's mines, has issued the following statement defining its position in the matter: "The action taken by the Anaconda company, which is in fact the Amalgamated, in bringing suit against the Butte-Ballaklava Copper Company in which claim is laid to ore already mined and being mined in the Ballaklava property is, we believe, unwarranted by the existing geology conditions. The best expert opinions we have been able to obtain are to the effect that orebodies so far opened up are without question owned absolutely by the Butte-Ballaklava Copper Company and the only inference is that the copper trust has taken this action to create a selling panic among Ballaklava stockholders, with the ultimate object of obtaining control of the company at a nominal cost. We have the best legal and the best engineering advice as to our rights and should the suit ever be brought to trial we are convinced that we will

be easily able to prove not only that the rich veins in the Ballaklava mine apex on our property but that much ore mined by the trust will eventually be shown to belong to the Ballaklava company. We sincerely trust that our stockholders will not permit themselves to be stampeded by this transparent subterfuge, but that they will stand back of us in our fight to protect their interests."

The Anaconda company suit against the Butte-Ballaklava company was to quiet title to certain mining property, restrain further extraction of ore therefrom, and obtain $1,880,000 damages for ore alleged to have been extracted by the defendant company. The complaint alleges that Anaconda is the owner of the Mountain Chief and Right Bower lode claims, from which ore has been taken by defendant through its Ballaklava shaft on the 100- to 1300-ft. levels. Reno H. Sales and F. A. Linforth, geologists for the Anaconda company, have filed affidavits on behalf of that company to the effect that their investigations have shown that the Ballaklava company is wrongfully taking ore from veins having their apex in the Anaconda company's Mountain Chief and Right Bower claims and upon these affidavits a restraining order has been issued preventing further work by the defendant upon the orebodies in question until Sept. 3, when the court will hear evidence upon the controversy.

Goldfield

Aug. 27—The Supreme Court has handed down a decision in the case of Gamble vs. Hanchett *et al.*, commonly known as the Silver Peak case. The case involves property valued at millions and the plaintiffs are now free to seek writs of assistance enabling them to go into the mine, to segregate their interests, to compel the defendants to put up a cash bond of $1,500,000 pending further action.

The Blue Light Copper Mining Company property, 16 miles from Mina, has been foreclosed to satisfy a mortgage of $156,100. Carl A. Platch bid the property in for the bondholders and it is authoritatively given out that reorganization and resumption of work will follow. About $300,000 has already been spent on the property, a well equipped shaft 752 ft. deep having been sunk.

Salt Lake City

Aug. 27—The new system for the survey of government lands, which will be under the supervision of the Interior department, instead of being done by contract will be used in southern Utah, in Iron, Washington, Kane, Garfield and San Juan counties. The surveying of these lands will be under immediate direction of Surveyor General Thomas Hull. A special appropriation of $50,000 has been made by Congress for this work, in addition to $15,000 available from the general appropriation for public surveys. It is estimated that it will cost about $200,000 to complete the surveys of the five counties. Mineral, oil and agricultural lands will be included. The surveyors will be employed directly by the government, at a salary of $200 per month and expenses. Five parties will be sent into the field, each consisting of from seven to 12 men. The total number in the field will be about 50, and it is expected they will be out from six to eight months. Heretofore the government has been doing all its surveying by contract, which has not proved satisfactory. The parties are being selected and equipped and will be sent into the field at once.

All unreserved nonmineral lands within the former Uintah Indian reservation thrown open for settlement July 14, 1906, and which have not been filed on by Aug. 28, 1910, will be sold at public auction Nov. 1, in tracts of 160 acres each, purchase price to be not less than 50c. per acre. No person will be allowed to buy more than 640 acres in his own right. There are also 25,170 acres of unappropriated land in Box Elder county, which will be open to settlement Oct. 22, and to entry Nov. 21.

Progress is being made in driving the Snake Creek tunnel. The face is now in over 1100 ft. There has been some delay recently in receiving air pipe, and only two shifts have been working on this account. The 40-horsepower locomotive to be used in moving the trains has not arrived, but is expected before the end of August. Notwithstanding these drawbacks, rapid work is being done. The tunnel is crosscutting the formation, and no timbering has been required. Little water has been encountered, although the face is approaching a point underneath the bed of Snake creek. About 2000 ft. further on, a porphyry dike will be cut, which, it is expected, will bring in considerable water. Beyond this a mineralized country is looked for. The recent agreement between the Daly West and Daly-Judge for the extension of the Ontario drain tunnel into Daly-Judge ground will in no way effect the driving of the Snake Creek tunnel, which will be continued with all possible expedition. Besides a large territory of its own to take care of and develop, the tunnel will tap the southwestern part of the Daly-Judge, fully two and one half miles from the Anchor shaft.

The Mammoth company has issued a report which discusses the first assessment, giving reasons for the same, and stating that the management has every reason to believe it will be the last. The company has paid $2,190,000 in dividends. In addition to the judgment of $177,000 paid the Grand Central, expenditures have been made of approximately $100,000 in acquiring ground which is known or believed to be valuable. This includes a half interest in the Don Pedro claim, from which the Gold Chain is mining valuable ore, also the Last Show claim from which rich gold ore was shipped. The wrecking of the hoisting engine and damage to the shaft in June have greatly retarded operations, and called for repairs amounting to nearly $12,000. A drift is being driven on the 1300-ft. level to cut the Gold Chain fissure. On the 2100-ft. level prospecting is being done near the northwest boundary lines in search of the Centennial-Eureka orezone, which, it is thought, may enter this ground. When repairs to the shaft and hoist are completed, development will be vigorously carried on at depth, and enough ore mined to avoid further assessments.

Cobalt

Aug. 29.—The first concentrating plant in Gowganda will be erected on the Reeves-Dobie property. It consists of four Nissen stamps and six concentrators. Part of the machinery is on the road, so that the plant will probably be in operation before winter. The Millerett mine has also a considerable quantity of milling ore on hand, and it is probable that a small plant may be installed the coming winter. As there appears to be no prospect of getting a railroad into the district, the larger properties there will have to concentrate their ore. Transportation in the winter is very expensive, while in the summer for any except high-grade ore, the cost is prohibitive.

The Porcupine Mine Owners' Association has been formed by the mine owners of the Porcupine district, Ontario, with Clement C. Foster as president, and H. P. Davis, secretary. The object is to promote the interests of the camp generally and establish and maintain a publicity bureau.

Guadalajara, Mexico

Aug. 27—In response to a protest from the American miners at Jalisco, Governor Miguel Ahumada suspended the operation of the new tax levied on ores and mill products by the state legislature until Sept. 1. The law, which calls for 1 per cent. of the gross products of the mines, plus 20 per cent. additional federal stamps, was made originally effective July 1. Governor Ahumada stated to the miners' committee that he would withhold the collection of the tax until the miners could have opportunity to demonstrate to him—as they claim they can—that all except one or two mines in Jalisco are merely in process of development and not yet on a profit-making basis. A committee, headed by James H. Howard, Dwight Furness, Antonio Perez Verdia F., and James P. Harvey, has sent out a circular to all miners of the State.

Much interest is felt in regard to the outcome of the matter, as it is considered vital to the progress of mining in Jalisco.

THE MINING NEWS

Reports of New Enterprises, New Machinery, Installations, Development Work and Property Transfers The Current History of Mining

Alaska

The first Alaska gold to reach the United States assay office at Seattle this season, was received Aug. 15. The lot was valued at $53,826 and was sent by the Miners' and Merchants' bank of Haiditarod. Its assay showed a value of $17.25 to $18 per oz., as compared with $18.25 for Nome and Fairbanks gold.

Alabama

Tennessee Coal, Iron and Railroad Company—The company has awarded a contract for three turbo-electric units of 3000 kw. capacity each, or 9000 units total, to the General Electric Company. This additional power will be distributed to supply deficits in power at the rail mill and steel works, coal mines and coke ovens of the company and for operating the plants of the American Steel and Wire Company now building at Corey. The company is installing new machinery and mills at Bessemer, in the plate department of its rolling mills. A water plate can be rolled as soon as the new work has been completed.

Fayette Light and Fuel Company—This company, of Fayette, 80 miles west of Birmingham, has ordered about 8 miles of piping, and has started the work on the trenches for the lines to handle natural gas from the Fayette fields into Fayette and beyond. A contract has been made with the Providence Oil and Gas Company for gas at the several flowing wells.

Consumers Natural Gas. Company—This company, capital stock $2,000,000, is being formed in Birmingham to build a pipe line into that city 60 miles from the gas wells.

Arizona

Development Company of America—This company, controlling several mining enterprises in Arizona, has requested all of its stockholders to loan the company 51 per cent. of their stock holdings in order to provide collateral for financing the corporation and its various enterprises. F. M. Murphy, the president, is of the opinion that necessary funds will be forthcoming if the 51 per cent. of stock is deposited, provided 60 days' time is given to parties making loan to examine properties.

Cochise County

Thompson, Towle & Co. say: There is cumulative evidence that a consolidation of the Calumet & Arizona and Superior & Pittsburg properties is not far distant. Rumors of a consolidation of the properties are taking more definite form, and there seems to be a well-founded belief that such a consolidation would be on a basis of five shares of Superior & Pittsburg for one of the former company. Developments at the Superior & Pittsburg have been gratifying, it being stated that the company is now in better condition than at any previous time as regards ore reserves.

Gila County

Live Oak—The 15th and 16th churn-drill holes have just been completed. The 16th hole, 500 ft. deep, encountered ore at 335 ft. and revealed a thickness of commercial ore of 150 ft. The 15th hole was drilled to 567 ft. and encountered ore at 450 ft. and revealed a thickness of shipping grade of 100 ft. The 17th hole is being drilled and is 420 ft. in chalcocite, running 2.25 per cent. in copper. The orebody differs somewhat in thickness from that at Miami and Inspiration and resembles more closely in more ways than one the orebodies of the Ray district.

California

There is talk of building a works to produce zinc oxide at Los Angeles. The ore supply would come from Yellow Pine, near Good Springs, Clark county, Nev., which district has lately been shipping considerable calamine ore to Kansas and Oklahoma.

Inyo County

Southern Belle—This company, with its mill four miles from Laws, has decided to do custom work, treating 10-ton lots at $4 per ton.

Mariposa County

Santa Clara—This company, of Briceburg, Willard P. Cram, of Fresno, manager, has ratified the agreement with the Montreal, Canada, syndicate by which the latter agrees to buy 110,000 shares of stock to be paid in four months. A power line is being run to the mine.

Modoc County

The custom mill in the Hoag district is ready to receive ore. The plant consists of rock breaker, sampler, 10-ft. Lane mill and cyanide plant.

Mountain View—At this mine of the Fort Bidwell Company, a rich streak of ore, averaging $272 per ton in gold and 1 ft. wide, has been drifted upon for 40 ft. Algernon Del Mar is engineer and A. J. Cummings president.

Nevada County

Golden Dream—This company has been organized to work the Golden Dream mine in Pleasant Valley, under supervision of J. F. Littlefield.

Arkansas Traveler—Excellent copper ore is being taken from the claim at Spencerville by Otto Woehler. The vein is about 8 ft. wide.

Murchie—This Nevada City mine, idle for a year and a half, is about to be started up again under new owners and management. Henry Fitter will continue as superintendent. The property has been placed under bond to H. F. Engelbright and Benjamin Ackerman.

Erie—If the new concentrators, now being installed in this mine at Graniteville, do not recover all of the precious metals, Manager Eckis will put in a cyanide plant.

Placer County

Swamp Angel—This gravel channel mine, six miles from Dutch Flat, has been bought by C. S. Noble and others of Arroyo Grande.

Plumas County

Channel—This mine near La Porte will shortly erect a stamp mill. Frank Tobin, of Oroville, is one of the owners.

San Luis Obispo County

Chorro—A 12-stamp mill is being erected, with concentrators, at this mine on the Jack ranch a few miles north of San Luis Obispo.

Shasta County

Monarch—This is the name of the new mine found recently by M. H. Trask and Ross Spencer two miles from Kennett. The vein was blind but was traced by rich float rock.

Old Spanish—This mine at Lower Springs, six miles from Redding, is to be reopened. There are large orebodies in the mine.

Black Tom—Three mines of this company's group are being developed at French gulch and the mill will start as soon as power connections are made. R. S. Archibald is in charge.

Sierra County

The recent gravel strike near Howland flat made by Messrs. Featherstone, Carmichael and Cosker, is considered to be an important one for that section. The gravel runs about $10 per car.

Laveroni—A strong vein has been found in this mine in Ladies cañon near Downieville.

Gold Star—A deposit of gravel overlooked by the Chinese miners has been found in this mine.

White Bear—Louis Barnhardt has taken charge of this property and extensive prospecting will be carried on.

Kate Hardy and Young America—Work has been stopped on these mines at Alleghany owing to disagreements among those holding the bond.

Carson—These mines at the head of Slug cañon have been placed under bond to George E. Turpen, of Downieville, and will now be developed.

SISKIYOU COUNTY

The copper claims of G. A. Tyler on Ash creek, nine miles from Hornbrook, are being developed.

Blue Ledge—This company is considering the building of a smeltery in the Blue Ledge district.

TRINITY COUNTY

New River—This company at Quimby is building a 2-mile ditch to bring water from Quimby creek.

TUOLUMNE COUNTY

App—The new management of this mine at Jamestown will at once begin sinking deeper and will add 40 stamps to the mill.

Colorado

BOULDER COUNTY

Brainard—These properties near Ward, together with the mill have been deeded to the Chicago & Colorado Mining and Milling Company, represented by Wesley Brainard, one of the former owners and associated with the Ex-secretary of the Treasury Lyman J. Gage, in the former extensive development operations on the properties.

CHAFFEE COUNTY

Gold Queen—This company will drive a tunnel to cut the extension of the Mary Murphy vein at St. Elmo; C. Kirchner, of Chicago, is in charge.

New Discovery—This company has been organized at Salida to operate on Monarch mountain. F. A. Cherry, of Pueblo, is president and H. G. Green the manager. Work will be resumed on the tunnel.

CLEAR CREEK AND GILPIN COUNTIES

Dives-Pelican—This group, near Silver Plume, has 425 acres of claims, with a 200-ton concentration plant, and four millsites. The Bismarck and Seven-Thirty groups, together with the Burleigh concentration plant, adjoins the former, and these mines have in the past produced millions in high grade silver-lead ores. They are owned in Louisville, Ky., and a report is current that the property is now being examined by an engineer, with a view to purchase by New York capitalists. There are said to be 20 miles of underground workings in the Dives-Pelican group. It is reported that in the Pelican a strike has been lately made of 7 ft. of ore that is shown by mill-run tests to yield from 400 to 600 oz. silver per ton. The manager is W. A. Hood.

Concrete—This property, in Eureka gulch, said to be the western extension of the Gunnell mine, is credited with a strike of free-gold ore 4 in. wide in the 900-ft. level. The Newhouse tunnel crosses the lode about 200 ft. below the lowest workings, and the water in the shaft is being lowered 4 in. per day.

Egyptian—This property on Quartz hill has been making heavy shipments for some time, the first-class smelting ore realizing $85 to $130 per ton in gold, and the second-class ore $45 per ton.

War Dance—This mine has just shipped 6500 lb. of ore which yielded 10 oz. gold to the ton, and 4½ oz. silver.

PITKIN COUNTY

At Aspen the Smuggler's compound compressor has been started, and the Free Silver shaft is being unwatered, which will drain other properties along the orebelt, making available large bodies of ore.

SAN JUAN DISTRICT

Kansas City—The Silverton district is agog with the reported discovery in this group of 3 ft. of ore which it is stated will run from 500 to 2000 oz. silver. The ore is said to be chiefly stromeyerite, which the whole of that region remembers as peculiar to the Yankee Girl, in the Red Mountain district in the early days, one carload of this ore having yielded $80,000.

Hamlet—This property, six miles from Silverton, and above Howardsville, is credited with a strike of 4-ft. of ore carrying 12 per cent. copper and 40 oz. silver. William Lloyd is manager.

Camp Bird—The July report shows 6818 tons crushed, yielding 9985 oz. of bullion and 824 tons concentrates. The receipts were $238,428 and expenses $51,065, leaving net, $187,363.

TELLER COUNTY—CRIPPLE CREEK

Isabella—The semi-annual report shows total receipts for the period of $122,991, of which $90,593 was from ore shipped by lessees, $5757 from ore mined on company account, and $11,009 from ores treated at the company's mill. Lessees received $47,779, while transportation and treatment charged totaled $75,411. The cash balance on hand is $8768, with several cars of ore unsettled for. The report gives the number of leased blocks at above 30, and the majority producing.

United Gold Mines—The Blue Stocking claim, on Battle mountain, has been leased, and work commenced, prospecting for the extension of the rich surface deposit recently discovered in the Strattons Independence ground adjoining. Lessees of the Deadwood, on Bull Hill, shipped three cars of $30 ore from the strike made recently on the 350-ft. level.

Mineral Hill Tunnel—It is reported that the stock of this company is being rapidly subscribed, and the fund will soon be sufficiently large to warrant the commencement of work.

Black Belle—The Union Leasing Company, holding a lease on this property, has struck a body of ore 1700 ft. from the portal of the tunnel, estimated to average $20 per ton.

Necessity—This mine, on Battle mountain, is said to be producing a carload a week of 2-oz. ore.

American Eagles—A shipment of 32 tons of ore to Denver from this Stratton Estate property ran 8 oz. gold to the ton; also one carload of 3-oz. and two carloads of 2-oz. ore were loaded out.

Doctor-Jack Pot—Shipments for the quarter were 2100 tons; net returns, $4150; cash reserve in the treasury, $6690.

Findley—Mullin & Co., leasing on the 11th level, 900 ft. below the surface, are reported to have opened 3 ft. of ore that yields 2 oz. gold to the ton. The mine is operated by nine sets of leasers, and the production is from seven to 10 cars of ore per week.

Gold King—This company, owning the El Paso mine at the head of Poverty gulch, has paid three dividends this year. The mine was leased to Owen Roberts 18 months ago, and is subleased to various sets.

Jerry Johnson—This mine, on Ironclad hill, under lease to Edwin Gaylord, is producing about 30 tons *per diem* of fair-grade gold ore.

Orpha May—This property, owned by the Stratton Estate, is sending out three carloads of $35 ore.

Idaho

COUER D'ALENE DISTRICT

Star—A shoot of galena ore 600 ft. long has been opened and the company will begin work early next year to drive a 6000-ft. tunnel.

Jack Waite—Fifteen feet of clean shipped ore has been opened on the 250-ft. level. The mine will begin shipments as soon as the wagon road is completed.

Black Horse—This property will probably be the next lead mine to begin regular shipments, as the 150-ton mill will be finished soon. The ore in sight is reported sufficient for a couple of years.

Interstate Mining Company—This company, composed of Duluth and Minneapolis people, has been organized with 250,000 shares, par value $10, to develop claims near the Hercules, Burke. The president is Gust Carlson, Hibbing, Minn. A bunkhouse, with baths and hot and cold water, will be started and a contract awarded for 500,000 ft. of the mining timber.

Indiana

Adams County

An eastern oil company is testing in this county. A well on the Sam Houk farm in the northern part is almost completed. The well was bailed out a few days ago and a large quantity of oil of excellent quality was obtained. The company has taken leases on considerable land.

Knox County

Coal lands amounting to more than 2000 acres have been purchased in Washington and Steel townships of this county by the Linton Coal Mining Company.

A test oil well is being drilled on the Cunningham farm in the lower part of this county.

Sullivan County

Bogin—This mine at Glendora, idle for three years, is being reopened and will furnish employment to 300 miners. The mine belongs to the Consolidated Indiana Coal Company. Electric haulage is being installed in this and in the United mine north of Sullivan. This mine also belongs to the Consolidated company.

Vigo County

Bunsen Coal Company—This Illinois company has been admitted to Indiana under the foreign corporation law. The company has a capital of $694,445. The company will open and operate coal mines in Indiana. Local offices will be maintained in Terre Haute. C. F. Lynch is president.

Lower Vein Coal Company—This company, of Terre Haute, has increased its capital from $50,000 to $150,000, and has decided to sink additional shafts and enlarge capacity.

Michigan

Copper

Adventure—The vertical shaft sinking to reach the series of lodes exposed in the drilling is down 725 ft. and within 200 ft. of the point where it is estimated that the first lode will be reached.

Calumet & Hecla—The company has begun the erection of a bath house and a new hospital. The work of replacing the guides in the rock-hoisting compartments of its Red Jacket shaft is well underway, during this time about 300 tons of rock per day is being handled through the men and material compartments.

Oneco—No. 8 hole in the southeast corner has been discontinued after entering the sandstone at 1250 ft. without results. The outfit has been moved to the site of No. 10 hole which is to complete the cross section of this portion of the lands. In all probability the shaft on the Oneco lode will be reopened and deepened.

Hancock—All the parts of the permanent power equipment have been delivered and the plant as a whole should be ready to go into commission about Jan. 1. The structural steel for the shaft house has been erected and the building is being inclosed. No. 2 vertical shaft is sinking at 2450 ft.

Houghton Copper—The company has begun surface trenching preparatory to shaft sinking and has secured some promising cores from the Superior-Baltic lode.

Indiana—No. 7 drill hole, sinking vertical to cut the Indiana lode at a point near the original discovery, is down 1200 ft. and it is estimated it will reach the lode at about 1400 ft. No. 9 hole, sinking at 200 ft. away on a line with No. 7, is down 1000 ft. With good results obtained in these cores it is likely a shaft will be started.

Iron

Richmond—This property, on the Cascade range, has substituted two locomotives for mules for hauling ore from the steam shovels to the crusher plant. The mine is worked by opencut.

Barnes—The Cleveland Cliffs company is extending the railroad from the North Lake mine to the Barnes, at Dexter.

Montana

Butte District

Butte & Superior—Three hundred and fifty tons are being shipped daily to the Basin Reduction Company, the ore averaging over 25 per cent. zinc, and the concentrates over 50 per cent. The company is employing 190 men. The new machine and blacksmith building is about completed.

Fergus County

Cumberland—Four cleanups have netted over $50,000. Six leaching tanks are being added to the four already in use and when installed the mill will have a daily capacity of over 250 tons. A new orebody has recently been struck and although already crosscut for 30 ft. the foot-wall has not yet been encountered. Seventy-five men are employed.

Granite County

At the Trilby claim in the Georgetown district leasers have recently cut an orebody a few feet north of the shaft. The Trilby is near the Hold Fast and Oro Fino claims, from both of which shipments are being made. The Southern Cross shipped 17 carloads of ore in July. The Mt. Royal company is installing a gasolene engine and compressor.

Jefferson County

Boston & Alta—Two feet of shipping ore has recently been encountered in the west drift on the 600-ft. level.

Lewis & Clark County

Souvenir—A special meeting of stockholders of this gold company will be held in Butte Sept. 12, to consider whether the property shall be sold or the stock made assessable.

Missoula County

Iron Mountain—Plans are being made for a 250-ton mill.

Nevada

Esmeralda County

The Florence and Consolidated companies have filed their reports and paid the bullion tax for the quarter ended June 30. The Consolidated paid $51,437 on a net profit of $1,743,631, while the Florence paid on net earning amounting to $26,448. The reported total costs were: Consolidated, $28.39 per ton; Florence, $9.85 per ton.

Florence—The last week has more than fulfilled the expectations of Manager Lawrence, in the development of the Reilly-lease stope. A series of raises from the 250-ft. level has exposed a large tonnage of milling ore which can be easily and cheaply extracted by the "glory hole" method.

Goldfield Consolidated—The department of inspection, recently organized, is making rapid progress in installing fire lines from the storage tank on Columbia mountain. The entire property will be amply protected.

Yellow Tiger—A quartz vein in the contact zone between the dacite and latite in the long crosscut from the station at 700 ft. is the most promising formation ever encountered on Tiger ground. Further developments are anxiously awaited.

Phoenix—This property at Rawhide is producing steadily; the output is to be materially increased with the installation of a compressor and air drills.

Tonopah Liberty—More than 250 tons of machinery is being hauled from Millers to the site of the company mill.

Humboldt County

There has been much development at Barrett Springs, eight miles west of Winnemucca. One shaft is down 84 ft. Many claims are being taken and other work is being done.

Gold Note Consolidated—Paul Klopstock is putting more men to work on the properties at Kennedy, 65 miles south of Winnemucca, and repairing the 20-stamp mill.

Nye County

Tonopah Extension—A long crosscut on the 500-ft. level has been started to tap the orebody known to exist between the 400- and 500-ft. levels. The "cap" rock extends down to within a comparatively short distance of the 400, and while the ore is not nearly gone, the present work will provide stoping ground for the future.

Montana-Tonopah—Bullion shipment for first half of August included 24 bars weighing 1800 pounds.

Tonopah-Belmont—A fault has been

encountered in the extreme east face of the drift, which has been following the Belmont vein continuously for 700 ft. Whether the extension of the orebody is immediately found or not, the situation is entirely satisfactory to the management.

Tonopah—A station is being cut at 434 ft. in the new Sand Grass shaft. This corresponds to the sixth level of the Red Plume and Mizpah workings. Extensive lateral work will not begin before reaching considerable additional depth.

Hayseed—This lease in the Lee-Echo district, near Rhyolite, is being operated at a good profit in spite of a 4-mile wagon haul to the mill. The property and neighboring territory have never been developed extensively.

WHITE PINE COUNTY

Giroux—Two of the five compartments of the new shaft were recently sunk from the 1200-ft. level to the 1280-ft. level, where it was found necessary to discontinue sinking on account of the inflow of water. The other three compartments of the shaft have since been raised to the 1200-ft. level, and a pocket is now being put in to receive the muck from the crosscut now being started to connect with the lower workings of the Alpha shaft, 750 ft. distant. Foundations for the hoisting plant are going in. The dome of the pumping station at the 1200-ft. level of the shaft is being lined with concrete, and as soon as this work is finished the pumps will be put in.

Nevada-British—A 22-ton mill, to treat the ore now being extracted from the company property under lease to the Glasgow & Western Exploration Company, is being built at Cherry creek. The latter company is making good progress in the construction of the plant and expects to have it in readiness to treat ore by the latter part of October. The mine is worked by the 800-ft. shaft of the Star mine of the Scotch company.

Nevada Consolidated—A temporary injunction has been granted in the Maine courts restraining the company from taking over the Cumberland-Ely property.

New Mexico

Mangas—An official statement says: "Rather than risk a reorganization, we concluded to temporarily close down our drilling operations and, if possible, secure extensions of time for payments. In this we have been successful. All important contracts have been extended for one year from October and November, except one, and in this case we have favorable promise. In June we secured an option on 1500 acres, known as the Tulloch group. The purchase price is to be $350,000, first payment of $87,500 to be made on Nov. 24, 1911; balance in equal payments on Nov. 24, 1912, and on Nov. 24, 1913. Everything considered, the acquisition of the Tulloch group, with its millsite, has added an immense value to the mineral holdings of the company. We have now approximately 2500 acres under option."

Pennsylvania

ANTHRACITE COAL

West Bear Ridge Colliery—A fire broke out in this colliery at Mahanoy Plane on Aug. 24. The extent of the fire is not yet fully ascertained. The colliery belongs to the Reading company and employed 500 men.

Lehigh Valley—This company has begun work on a large collecting and distributing yard at Hazel Creek Junction, two miles above Weatherly. The yard will have 42 miles of tracks, and all the coal from the Hazleton and Mahanoy divisions will be handled there. A new cut-off line is to be built from this yard to the main line at Drifton, to avoid the heavy grades around Penn Haven.

South Dakota

Mainstay—The mill of this company and other mining properties at Keystone are under option and are being examined.

Texas

El Paso Tin Mining and Smelting Company—This company expects to put its concentrating mill and smelting works in operation during September. The mill will employ a dry process. The mines are at Camp Florella, on the east side of Mt. Franklin, near El Paso.

Utah

BOX ELDER COUNTY

Silver Island Coalition—Work is being pushed on the new tunnel, which will tap the vein near the 850-ft. point. The compressor and drills are being used. During two years 247 tons of ore have been produced, which gave net returns of $21,485. This ore came from shallow surface workings. The property is 16 miles from Wendover on the new line of the Western Pacific.

JUAB COUNTY

Suit was filed in Provo by the Beck Tunnel Mining Company, charging the Uncle Sam Mining Company with the illegal extraction of ore, and asking for an injunction. The ore is alleged to have been extracted from the Cyrus Oliver claim of the Beck Tunnel group, which adjoins the famous Humbug claim. It is charged that 2000 tons of ore have been mined, and that it averaged $50 per ton, or a total of $100,000. The suit is brought for $300,000, or three times the value of the ore. A temporary injunction has been granted. The ore in dispute occurred higher up the hill than the original Beck Tunnel orebodies. It is understood to involve a question of apex.

Colorado—Ore has been cut 50 ft. below the 300 level, and has been drifted in 15 ft. The discovery is 350 ft. from the Sioux Consolidated lines. On the 500-ft. level the drift east of the shaft is in promising ground.

Chief Consolidated—Smeltery returns, after paying freight and treatment, inclusive, are given as $4479. These shipments amounted to 255 tons, making an average value of $17.56 a ton. The shipments bring the total receipts up to $98,790, which approximately balances the development and mining costs. The ore mined thus far has come mainly from development on the 1400- and 1600-ft. levels. Work is being done in Eureka City ground. The net smeltery returns for June were $22,900.

Crown Point—Bids are being received for the sinking of a new shaft. John Roundy, formerly in charge of the Colorado and Iron Blossom, is superintendent.

Sioux Consolidated—Shipments are being maintained at the usual rate and the grade of ore has improved over that shipped several weeks ago. Mine conditions are said to be satisfactory.

Victoria—The shaft is being sunk to the 1100-ft. level to make connections with levels on which ore has been blocked out. These connections should be made by November, and will allow more economical mining. The present work is not interfering with production.

Crown Point—A contract for sinking the new shaft 100 ft. has been given. The location is 1000 ft. from the old shaft.

Centennial-Eureka—The new centrifugal pumps which have been installed on the 2200-ft. level are being tried out and adjusted. Connections have been made with the orebody recently opened by the Opex in United States ground, and shipments are being made.

Iron Blossom—The No. 1 shaft is 1760 ft. deep, and sinking is being continued. About 80 tons of ore daily is mined from the 500-ft. level, where a body of gold ore was opened some time ago. The gold ore forms a part of the shipments. Ore has been opened on the 400- and 600-ft. levels, and a strike has been reported recently on the 1100.

Tintic Standard—A diamond drill has been installed on the 1000-ft. level, and 10 ft. per shift is being made in drilling. The ground southeast of the shaft will be prospected.

Gold Chain—The ore on the 300-ft. level is being further developed. Some stoping has been done. Drifting is under way to catch this ore on the 400. It has been proposed to connect the Gold Chain and Opohongo workings, to allow the lat-

ter to send ore out through the Gold Chain shaft.

Grand Central—The mine is reported to be in a condition to double the output at any time. On the 2000-ft. level, gold ore 10 to 20 ft. in thickness has been developed. Drifting on the 1800 level toward the east is in progress to look for the ore opened on the 2000. Four feet of ore carrying hornsilver has been cut on the 800 level.

PIUTE COUNTY

Bully Boy—A lease has been taken on this and the Webster property. The 2300-ft. tunnel is being cleaned out and repaired. It is the intention to drive this some distance ahead to cut veins from which shipments of gold ore were made at higher levels.

SALT LAKE COUNTY

Ohio Copper—General Manager Colin McIntosh has returned from Europe. The mill will be finished shortly. It is practically ready for the crushers and tables in the second half, other parts of the equipment having been installed during the past few months. The half now in operation is treating more than its designed tonnage, and is reported to be making a saving of from 60 per cent. to 70 per cent.

Utah Leasing Company—An order has been placed with the Allis-Chalmers Company for a 50-ton cyanide plant, to be installed within two months at the old Telegraph mine in Upper Bingham. The company holds a long-time lease on the Telegraph, which is owned by the United States Smelting Company. The lease has been worked several years and has snipped highly silicious gold and silver ores to the Yampa and to the Valley smelters. This material was used for converting lining. Experiments to determine a method of treatment for the ore have been made by T. P. Holt, of the University of Utah. It is the intention to slime the ore, and after agitation with cyanide to filter the product through an Oliver filter. The ore carries $6 to $8 per ton in gold and silver, and a saving of 80 per cent. is expected. J. C. Dick is president and general manager.

Utah Metal—The tunnel is in about 3500 ft. A zone of fractured quartzite has been encountered which breaks much better than heretofore. Timbering has been necessary in this fractured zone.

Bonnie Briar—A bond and lease has been taken on this property in Big Cottonwood by W. M. Wagstaff and G. S. Hayes.

Carbonate—Shipments of silver-lead ore have been started. The ore is being hauled by teams to the sampler at Murray.

South Columbus—It is proposed to merge this company with the Alta-Hecla under the name of the South Hecla, with a capitalization of 500,000 shares. Under this plan the shareholders of each of the present companies will receive 100,000 shares, the balance to be held in the treasury for development. The matter will be acted on Sept. 5. The two properties adjoin and comprise a territory of approximately 550 acres.

SUMMIT COUNTY

Daly-West—The ore cut Aug. 18 on the 1900-ft. level is reported good milling grade, but little is as yet known of its extent. Work has been started on the 2100 or main-tunnel level toward this point. The last quarterly report showed total receipts of $226,513, expenditures, $213,971, leaving $166,380 on hand June 30. The earnings during the quarter exceeded dividends by $12,542. The results of development during the quarter were not altogether favorable, the value of the ore developed being lower and the amount less. Production has been decreased, and an effort is being made to push development, with the possibility of erecting a new mill at the mouth of Ontario drain tunnel No. 2, if enough ore is blocked out to warrant it. It is thought an increased profit can be made by a further treatment of the zinc concentrates.

UTAH COUNTY

Mineral Flat—The American Fork Mining and Power Company has brought suit against this company for possession of parts of the Waterfall, Last Chance and Last Chance Nos. 1 and 2 claims in American Fork cañon. It is alleged the defendant company has included these claims in surveys for patent.

Mineral Flat Extension—Recent development shows the vein to be getting larger. Eight feet of ore, carrying gold, silver and copper, have been opened in the tunnel.

Canada

ALBERTA

The occurrences of much asphalt along the Athabasca river has been reported by an exploring party lately returned from Peace River district. In the vicinity of Fort McMurray especially, there are large quantities, and it is being used locally in its raw condition to cover roofs of log houses. Two big deposits of salt have also been found near Fort McMurray in oil boring.

Great Granite—An 80-h.p. boiler, half of a Canadian-Rand 15-drill compressor, two 3¼-in. machine drills, a 7x10 Lidgerwood hoist and other machinery have been put in at this company's Lucky Jim mine on Valdes island. An incline shaft is down 100 ft. and drifting both ways in an 8-ft. ore shoot is in progress. George D. Mumford, Vancouver, is managing director.

BRITISH COLUMBIA

A new standard-gage railroad is being built by the McKenzie-Mann interests to the properties on Bitter creek, Bear river and to the Nass country. H. E. Knobel, of Stewart, has charge.

Marble Bay—After much bornite ore has been mined on the 1060-ft. level, a winze has been sunk on the 1160-ft., and crosscutting to the orebody is in progress. The ore contains silver as well as copper. The mine is on Texada island and is owned by the Tacoma Steel Company. Alexander Grant, Van Anda, is manager.

Lucky Jim—No. 5 adit, 80 ft. lower than No. 4, has intersected two important zinc orebodies. The first was cut at 380 ft. and shows about 20 ft. of zinc ore of shipping grade; the second was entered at between 800 and 900 ft. from portal and is 90 ft. in width—6 ft. of lead and the remainder zinc. This orebody has increased in width 50 ft. in a vertical depth of 240 ft. Driving of No. 6 adit has been commenced at railway level, about 450 ft. below No. 5. The mine is near Bear Lake, Slocan. A. J. Becker is superintendent.

Princeton Cement—This company has been organized to manufacture Portland cement near Princeton, Similkameen. Connection with Great Northern railway by an 8000-ft. spur will give transportation facilities.

Blue Bell—Operations at this zinc property will be resumed under the direction of S. S. Fowler.

Rambler-Cariboo—Operations will be resumed at this mine, which has been closed owing to loss of the equipment by fire.

Red Cliff—Machinery is being installed on this property in the Stewart district. E. E. Smith is manager.

Jewel—The equipment of the new 15-stamp mill has been completed. When the electric transmission line, recently damaged by forest fires, is repaired, quartz crushing will be commenced. A Nichols slimes-saving plant has been installed. R. Roberts, Greenwood, is manager.

Canadian Metal—Announcement has been made of early resumption at this company's Blue Bell mine at Kootenay lake. The capacity of the mill is to be increased. S. S. Fowler, Riondel, is general manager.

Fife—Working force, now 24 men, is to be augmented and power plant enlarged. The winze from the main adit is 235 ft. deep. A station is being opened preparatory to drifting both ways in the orebody. Ore is copper-gold of fair grade. Charles Dempster, Rossland, is manager.

Pacific Coast Coal—Daily output is between 800 and 900 tons. Demand for coal is brisk and market for larger production is assured.

ONTARIO

Shipments of ore from Cobalt for the week ended Aug. 19 were: Buffalo, 63,370 lb.; Chambers-Ferland, 60,500; Cobalt Townsite, 55,980; Coniagas, 120,570; Crown Reserve, 84,000; Kerr Lake, 300,105; La Rose, 203,000; McKinley-Darragh, 52,300; Nipissing, 255,760; O'Brien, 64,060; Trethewey, 42,970. Total, 1,302,615 pounds.

Mackenzie & Mann, of Toronto, have closed options on iron ore claims at Grand Rapids on the Metagami river covering 4400 acres, including practically all the ore so far exposed on that field. They will at once put five diamond drills to work on the property.

Cartwright—On this property at Pearl Lake, Porcupine district, a 20-ft. vein of quartz carrying free gold on the surface has been uncovered and traced for 900 feet.

Ophir—This gold mine in the Kenora district, closed for some years on account of litigation, is to be developed. A contract for the sinking of a shaft on the vein has been let.

Lawrentian—This mine in the Manitou Lake gold area will be reopened by the Merger Mining Company, of which J. S. Corliss is president and F R. Warner, general manager.

Otisse—This Elk Lake company, which suspended operations a month ago, has been empowered by the shareholders to increase its capital from $2,000,000 to $2,500,000 to carry on development.

Morrison—The option given to an English company on this Miller Lake property has been lapsed. Active development is going on. Good ore carrying native silver has been found in a test pit 1000 ft. from the discovery. Native bismuth has also been encountered.

Beaver—A new stringer of high-grade ore about 3 in. wide, assaying 2500 oz. to the ton, has been found at the 200-ft. level. Both the main shaft and winze are now down to 300 ft. The property is in Cobalt camp.

Redeemer—This Eagle Lake gold mine is being reopened, with Frank R. Roberts, an Arizona mining engineer, in charge of operations. After the mine has been unwatered development will be undertaken by drifting and crosscutting from the foot of the shaft and the mill started.

Timmins—It is stated that two tons of ore run through the small stamp mill at Porcupine now in operation produced 35 oz. of gold valued at $700.

QUEBEC

A deposit of titaniferous iron ore has been discovered near d'Jury station, 80 miles north of Montreal. Little work has been done so far, but all indications point to the existence of an iron range of considerable dimensions. Analyses gave from 25 to 40 per cent. titanic acid, and from 35 to 43 per cent. metallic iron. The deposit is one mile from the railroad.

Amherst Graphite Mines—The compressor plant at these mines, owned by Graphite, Ltd., of Montreal, is complete. Recent surface work shows that the deposit is wider than originally supposed, its total width so far opened is from 12 to 25 ft. It still continues under the heavy drift. A shaft is being sunk now from 50 to 100 ft. The graphite occurs in flake form in lenticular deposits, sometimes disseminated, sometimes in pure flake accumulations.

Gilbert River Gold Alluvions—Progress is being made with the drilling operations in the Gilbert river, county of Beauce. A Keystone power drill and 4 Empire drills are in commission on the lower (St. Charles) and upper (DeLery) river bed, the depth on the former ranging from 7 to 12 ft. and on the latter from 40 to 45 ft. The gold channel on the Ruisseau des Meules is found to be from 80 to 120 ft. wide and at least 1000 ft. long. The installation of a hydraulic elevator on this location is being considered.

Frontenac Asbestos—This company is prospecting work on the western part of its property with a Calyx shot drill. It is reported that good ground was encountered toward the Ling mine.

B. & A.—This asbestos company, operating on lot 9, Thetford, 2 miles from Robertson, has recently completed a 2-cyclone mill. Three more cyclones of the Pharo type are being installed.

Bell—This asbestos company has a big milling plant under construction, which will likely be finished in the fall.

Amalgamated Asbestos Corporation—All the properties of this company are worked to their full extent. Most of the cyclones of the older type in the mills have been replaced by the Pharo cyclone, a recent invention which has given good satisfaction in the extraction of the fiber from the rock.

YUKON TERRITORY

Advices from Dawson state that estimates place this season's yield of placer gold at $5,000,000, as compared with $3,000,000 for 1909. Much of this will be from ground previously worked by individual miners using crude methods. Modern equipments and methods of the large operators result in the recovery of much gold not saved when first roughly worked by individual miners.

Atlas—New buildings have been erected at the company's Pueblo mine, Whitehorse copper camp, and a compressor installed, preparatory to commencing shipping 200 tons daily.

Yukon Gold—M. Robert Guggenheim, of Seattle, Wash., states that the dredging and other mining operations of the company in Yukon territory are proving successful this year. The ouput will largely exceed that of last year, while expectations for next year are that there will be an increase of 50 per cent. in production, with enlarged plant and an increased area of ground being worked. The estimates of the company's experts, as to both richness of ground and production of gold, have been fully realized by actual results.

Mexico

CHIHUAHUA

Dolores—The stockholders are asked to transfer their shares for stock of the Mines Company of America, through the United States Mortgage and Trust Company, New York, on a basis of one $10 Mines company share for each $5 Dolores share, which is on the basis of 10 for 1 on the old basis of Mines company capitalization. They have until Jan. 11 to make the transfer. The Dolores company for the quarter ended with June, earned $116,070 net or $26,000 above its dividend requirements.

GUERRERO

A railroad from Acapulco to Sihuatanejo in Guerrero is being built, a distance of 120 miles. Moritz Thomsen, of Spokane, W. D. Hofius and R. R. Spencer, of Seattle, are reported back of the enterprise.

JALISCO

Mexican Iron and Steel Company—This company, worked by Boston capital, has completed the payment of 300,000 pesos to Daniel Ochia, of Guadalajara, for the Tula iron mines and iron plant. Extensive improvements are planned and large operations expected. The iron deposits are in the southern part of the State some distance from a railroad.

Boco Ancha—This company at Ayutla will enlarge its mill and add a cyanide plant. George E. Zimmerman is secretary and J. L. Crum superintendent.

Bolaños—This mine in northern Jalisco has been sold by F. W. Oldfield to a Los Angeles company.

NUEVO LEON

Curz del Aire—The sale of this lead-silver property at Lampazos for $250,000 to French interests is reported. Extensive improvements will follow.

Europe

RUSSIA

Minister of Commerce Timashoff has called a meeting of representatives of the metallurgical industry to discuss temporary free importation of pig iron to relieve the iron famine and counteract the excessive high prices of iron in Russia. Iron manufacturers in the St. Petersburg, Moscow and Riga districts complain that the iron producers in South Russia refuse to fill orders at fixed dates, giving as a reason the desertion of their mines by the workingmen, who are fleeing owing to cholera.

THE MARKETS

Current Prices of Metal, Minerals, Coal and Stocks, Conditions and Commercial Statistics

Coal Trade Review

New York, Aug. 31—The coal conditions in the West are still unsettled. The Illinois miners have apparently settled down for a long, hard fight. The defeat of President Lewis and the success of the turbulent element at the Indianapolis meeting have confirmed them in their resolution to reject the operators' offer. It seems, however, uncertain whether they can command financial support. The treasury is empty, and already miners in other districts are complaining of the heavy assessment levied. On the other hand, the operators are firm in their decision to make no concession. They have gone so far as to give bonds to be forfeited if any member makes terms outside the association.

In the Southwest also the strikes continue, with no present prospect of settlement.

The situation is throwing a good deal of trade to Indiana, Ohio and West Virginia mines which are working, and in these States operators are doing well. They are keeping their mines busy and getting good prices. There is beginning to be complaint about car shortage, especially in West Virginia.

In the East the coal trade is generally steady and without special incident. This applies to both the anthracite and bituminous trades.

Duty on Washed Coal—In an appeal of Waterhouse & Co. from the decision of the collector of customs at Seattle, the Board of General Appraisers has decided that coal which, after being mined, had been washed in water by the use of machinery or otherwise prior to exportation, so as to remove the dirt, duff, fine coal or other impurities of like kind, is dutiable at 45c. per ton under paragraph 428 of the tariff act of 1909, and not at 15c. per ton as coal slack or culm, such as will pass through a ½-in. screen, as claimed by the importers. The words culm or slack apply only to coal screened and not washed or otherwise prepared.

Coal Tariff Notes

Coal passing Davis Island dams, on the Ohio, six months ended June 30, was 2,341,195 short tons in 1909, and 1,377,685 in 1910; decrease, 963,510 tons.

Coal passing through locks on the Monongahela above Pittsburg, six months ended June 30, was 4,864,000 short tons in 1909, and 4,752,680 in 1910; decrease, 111,320 tons.

Coastwise shipments of coal from leading Atlantic ports, six months ended June 30, long tons:

	Anthracite.	Bitum.	Total.	PerCt.
New York....	7,622,377	5,590,665	13,213,042	61.5
Philadelphia	1,065,356	2,256,683	3,322,039	15.5
Baltimore....	136,207	1,738,331	1,874,538	8.7
Newp't News	.....	1,473,798	1,473,798	6.9
Norfolk.....	.....	1,598,377	1,598,377	7.4
Total.....	8,823,940	12,657,854	21,481,794	100.0
Total, 1909.	8,987,071	11,385,607	20,372,678	.....

Total increase this year, 1,109,116 tons, or 5.4 per cent. Norfolk includes Sewall's Point; New York, all the harbor shipping points.

Bituminous-coal and coke tonnage of leading railroads in Pennsylvania and West Virginia, six months ended June 30, short tons:

	Bituminous.	Coke.	Total.
Pennsylvania.....	20,218,095	7,270,683	27,488,778
Balt. & Ohio.....	13,828,563	2,269,823	16,098,386
Buff., Roch. & Pitts.	3,548,322	315,882	3,864,204
Buff. & Susqueh'na	644,617	132,016	776,633
Penn. lines, N. Y. C.	4,026,994	27,034	4,054,028
Pitts. & L. Erie.....	4,947,405	3,451,869	8,399,274
Pitts., Shawmut&N.	543,071	11,384	554,455
Norfolk & Western.	8,293,597	1,552,136	9,845,733
Ches. & Ohio.....	7,747,818	243,110	7,990,928
Virginian.....	371,387	.....	371,387
Total.....	64,169,869	15,273,937	79,443,806
Total, 1908.....	52,090,057	11,129,664	63,219,721

Total increase this year, 16,224,085 tons, or 31.1 per cent. Virginian railway tonnages are tidewater coal only. Anthracite tonnages of Pennsylvania and Baltimore & Ohio are given elsewhere.

Coal shipments over railroads in the Ohio Coal Traffic Association, six months ended June 30, short tons:

	1909.	1910.	Changes.
Hocking Valley.....	1,278,385	2,058,791	I. 780,406
Toledo & Ohio Cent..	540,994	920,649	I. 379,655
Baltimore & Ohio ...	602,098	1,153,510	I. 551,412
Wheeling & L. Erie.	1,395,246	1,813,157	I. 417,911
Cleve., Lorain & Wh.	1,054,152	1,614,757	I. 560,605
Zanesville & Western	503,122	599,311	I. 96,189
Toledo Div., Pen. Co.	837,617	1,110,118	I. 272 501
L. Erie, Alliance & Wh.	458,918	545.471	I. 86,553
Marietta, Col. & Clev.	35,474	50,817	I. 15,343
Wabash-Pitts. Term.	8,097	27,073	I. 18,976
Total.....	6,714,103	9,893,654	I.3,179,551

Total increase this year 47.4 per cent. Baltimore & Ohio tonnage is of Ohio lines only; main-line tonnage is given elsewhere.

New York

Anthracite

Aug. 31—Trade is showing some improvement locally, as the season for putting in winter stocks comes on. There is also some improvement in the demand for steam sizes.

Tomorrow—Sept. 1—The summer discounts are ended. Schedule prices for large sizes from that date will be $4.75 for broken and $5 for egg, stove and chestnut, f.o.b. New York harbor. For steam sizes, current quotations are: Pea, $2.95@3.25; buckwheat, $2.15@2.50; No. 2 buckwheat, or rice, $1.65@2; barley, $1.35@1.50; all according to quality, f.o.b. New York harbor.

Bituminous

Trade continues rather dull for the most part. New York harbor trade is slow, especially for the better grades of coal. There is some demand for gas slack, which has been rather scarce. All-rail trade is reported in a better condition than seaboard business.

Steam coals can be bought at $2.40@2.80, f.o.b. New York harbor, according to quality. The mines are generally active, as the strikes in the West are still making a demand on mines which usually ship to tidewater.

Transportation is inclined to be slow. Some complaints are heard of a short supply of cars, but there are enough to be had on most roads. The supplies at tidewater are not excessive.

In the coastwise trade vessels are still plenty and rates remain low. Large boats from Philadelphia get 70c. to Boston, Salem and Portland. From New York small vessels are to be had at 50@55c. to points beyond Cape Cod.

Birmingham

Aug. 29—With the exception of those mines which sell exculsively to the railroads in the district, there is steady operation at collieries throughout Alabama. Railroads in the Southeast and Southwest have placed good orders for coal with the operators in this section, while shipping interests at New Orleans, Mobile and Pensacola are looking to this district for coal in quantity. During the past week one of the larger commercial coal companies had a rush order for 5000 tons of coal to fill, a ship sailing for Spain requiring hasty shipments of fuel. The home consumption of coal is steady. There are orders on hand that will require a full operation at the greater number of mines in the State. Mines supplying the railroads in home territory are not running on full time, but it is expected that some of the mines will have to help out the other collieries shortly.

The demand for coke is strong and the make is larger right now than it has been for some time.

Chicago

Aug. 29—With the hope of large supplies soon from the Illinois mines gone, through the action of the Indianapolis convention, prices have risen and probably will continue to rise in the coming

week, on the Indiana coals, which supply most of the steam makers in this territory. All coals, indeed, are very firm, smokeless being especially so in view of the advance in prices to take effect Sept. 1. The big consumers and some retailers are becoming alarmed over the situation and are seeking to cover their needs and to accumulate storage piles before cold weather shall set in. Retail demands are also becoming strong from city and country dealers. The hope of nearly every consumer of a large amount of bituminous coal seems to be to buy at August prices, which naturally makes an active market, quite different from normal summer sluggishness.

Lump from Indiana brings now $2.40 @2.75, in car lots; run-of-mine, $2.25@ 2.40, and screenings, $2.15@2.30. The passing of the summer is evident in the increased demand for lump and run-of-mine, though screenings are and will continue to be very largely in demand. Smokeless, when sold at August prices, brings $3.55 for lump and $3.15 for run-of-mine, circular quotations, but there is hardly any on the market at those prices and September will see an advance of 15c. Hocking and other coals from east of Indiana are very firm and are sharing in the general demand. It is perhaps needless to say that no coal is now sold at a cut price to avoid demurrage charges.

Cleveland

Aug. 29—Locally prices are firm, but this is chiefly on account of light receipts. Slack is scarce, owing to the falling off in the lake trade.

Middle district coal is quoted $2.15 for 1¼-in., $1.90 for ¾-in. and $1.80 for run-of-mine. No. 8 and Cambridge districts, 5c. to 15c. higher, all f.o.b. Cleveland delivery. Slack is nominally $1.55 @1.65, but premiums of 10 to 20c. have been paid for special lots. Pocahontas is $3.10 for lump and $2.45 for run-of-mine.

Indianapolis

Aug. 29—The most important development in the coal business during the week was the certifying of a large and wealthy coal mining company of Illinois to do business in Indiana. Other corporations are said to have sent their agents to look over the Indiana field. Large coal consumers are buying thousands of tons of Indiana coal, both for early and later delivery. The mines are working full capacity and there is little or no labor trouble. An advance in the price of coal is anticipated the first week in September. The conditions in Indiana are very gratifying to the operators.

Pittsburg

Aug. 30—Local demand for coal continues quiet and Lake shipments, although heavy, continue to show the decreasing tendency noted for the past two or three weeks. Prices are well held at the reduced level quoted last week: Mine-run and nut, $1.15@1.20; ¾-in., $1.30; domestic, 1¼-in. lump, $1.45@1.50; slack, 70@80c. per ton.

Connellsville Coke—The market is moving along without much incident, prompt furnace coke being steady at the 5c. reduction noted a week ago, while prompt foundry coke is also quotable about 5c. lower than formerly. We note a sale of 2000 tons of furnace coke for September at $1.60 and 125 cars, four cars daily, at $1.65. Nothing is being done on contract. We quote standard grades of Connellsville coke per net ton: Prompt furnace, $1.60@1.65; contract (nominal), $1.75@1.85; prompt foundry, $2.10@2.25; contract, $2.25@2.50, all at ovens.

The *Courier* reports production in the Connellsville and lower Connellsville region in the week ended Aug. 20 at 365,-724 tons, a decrease of 1500 tons, and shipments of 3918 cars to Pittsburg, 5546 cars to points west and 884 cars to points east, a total of 10,348 cars, an increase of 300 cars.

St. Louis

Aug. 29—The coal market for the past week has been advancing steadily and coal has been going up at the rate of about 5c. per ton daily. The buying has been confined almost entirely to the roalroads and large manufacturing interests. Dealers have been trying to buy but have been unable to locate any domestic coal. Owing to the fact that the railroads are taking practically all the coal that is produced and paying almost any price that is being asked, operators do not care to cater to domestic trade. This is leaving the dealers in a bad fix. If they are having trouble in making purchases now what can they expect in another three or four weeks when the fall rush is on in earnest?

The fall trade is opening up with prices about 75c. per ton higher than the usual opening.

Owing to the fact that Arkansas anthracite is not coming into the market this year, owing to the strike in that district, dealers are beginning to substitute West Virginia smokeless. West Virginia smokeless resembles Arkansas both in appearance and burning qualities and is perhaps even a trifle better. It can be sold in St. Louis about $1 per ton cheaper than Arkansas and consequently is taking very well.

The anthracite market is in good shape and all wholesale companies report that they are behind in orders on all sizes. The demand from the country for chestnut is very strong, and that size is already scarce. Grate is selling better than usual at this time of year.

Current prices on the St. Louis market are as follows:

	Mine.	St. Louis.
Illinois, Standard:		
6-in. lump and egg	$2.00	$2.52
2-in. lump	1.70	2.22
Mine-run	1.50	2.02
Screenings	1.10	1.62
Trenton:		
6-in. lump and egg	2.25	2.77
3-in. nut	2.00	2.52
Staunton or Mt. Olive:		
6-in. lump	1.75	2.27
2-in. nut	1.60	2.12
Mine-run	1.50	2.02
Screenings	1.20	1.72
Carterville:		
6-in. lump or egg	2.00	2.67
3-in. nut	1.75	2.42
Mine-run	1.50	2.17
Screenings	1.30	1.97
Pocahontas and New River:		
Lump or egg	1.90	4.40
Mine-run	1.25	3.75
Pennsylvania Anthracite:		
Nut, stove or egg	.....	6.85
Grate	.....	6.60
Coke:		
Connellsville foundry	.....	5.40
Gas house	.....	4.90
Smithing	.....	4.15

FOREIGN·COAL·TRADE

Nova Scotia Coal—Shipments of coal from Nova Scotia mines, seven months ended July 31, long tons:

Company:	1909.	1910.	Changes.
Dominion	1,452,733	1,618,311	I. 165,578
Intercolonial	129,627	142,658	I. 13,031
Nova Scotia Steel	368,566	414,051	I. 45,485
Acadia	152,054	143,185	D. 8,869
Maritime	49,289	85,571	I. 36,282
Total	2,152,269	2,403,776	I. 251,507

The total increase reported this year was 11.7 per cent.

Austrian Coal—Coal production in Austria half year ended June 30, metric tons:

	1909.	1910.	Changes.
Coal	6,818,446	6,811,892	D. 6,554
Brown coal	12,606,988	12,171,540	D. 435,448
Total mined	19,425,434	18,983,432	D. 442,002
Coke made	917,430	972,014	I. 54,584
Briquets made	174,745	161,705	D. 13,040

Of the briquets reported this year 82,-235 tons were made from brown coal or lignite.

Welsh Coal Prices—Messrs. Hull. Blyth & Co., London and Cardiff. report current prices of Welsh coal as follows, on Aug. 20: Best Welsh steam, $3.96; seconds, $3.78; thirds, $3.60; dry coals, $3.60; best Monmouthshire, $3.54; seconds, $3.42; best steam smalls, $2.16; seconds, $1.92. All prices are per long ton, f.o.b. shipping port, cash in 30 days, less 2½ per cent. discount.

IRON·TRADE·REVIEW

New York, Aug. 31—With the approach of September and the end of the mid-summer-vacation season, there seems to be an improvement in the iron and steel markets. This is not so much shown by actual new sales as by better specifications on contracts and an increasing list of inquiries. There is also a more cheerful feeling; there is something in the air

which makes everyone take a more hopeful view of the immediate future. Users of iron who have been buying for short deliveries all the year are beginning to ask about prices and contracts for 1911. No one looks for a boom, but many are figuring on better business.

In pig iron, makers are assuming that bottom prices have been reached, and are not inclined to sell far ahead at present quotations. This does not agree with buyers' ideas, and they are not disposed to pay more. It is pointed out that there is no reason for making higher figures so long as there are heavy stocks of unsold iron in the yards. These accumulations are being gradually worked down, perhaps, but the make is still large enough to prevent any rapid reduction. The inquiries coming in the East are chiefly for foundry iron, with some basic; in the Central West they are for bessemer and basic pig. Consumers' stocks are not large, as a rule, and the burden of carrying the surplus iron has been left to the furnaces.

In finished material structural steel is still the leader, and new business is larger than in any other line. Wire and wire products come next, as was to be expected at this season. Jobbers are showing more confidence about stocking up than they have done for some time. In plates there has been little new business, but specifications on contracts are coming more freely. Sheets are lagging, and there is some shading on prices to secure orders to keep mills going. The main trouble is not in accumulated stocks, but in surplus capacity of mills.

The coming month will determine pretty well the course of business for the winter. It depends largely upon the willingness of the large interests to accept conditions and to refrain from any attempt to put up quotations.

Lake Superior Iron-Ore—The shipments of ore from the Lake Superior region are falling off, and some large mines are reported to be closing down for the season. A number of boats are reported tied up, though there are three months of navigation still to come. The Lake Erie docks are full of ore, and shipments to furnaces have been slow.

Baltimore

Aug. 30—Imports for the week included 335 tons ferromanganese and 1410 tons manganese ore from Liverpool; 18,000 tons iron-ore from Cuba.

Birmingham

Aug. 29—Southern furnace companies are selling a little pig iron, but there is yet complaint that the market is dull. Iron prices in this section are firm on a basis of $11.50 per ton for No. 2 foundry. All manufacturers are now quoting this figure and the statement is made that some of them are selling iron for delivery through the balance of the year on that basis. There has not been much, if any, iron sold yet by the Southern manufacturers for delivery during the first quarter of the coming year. The accumulated stocks of iron in this part of the country are beginning to show signs of reduction, but not to any great extent. The statement is made that all iron that has been selling under $11.50 came from accumulated stocks. Until the accumulated iron is out of the way there will not be any need for a larger production.

A few orders for steel rails have recently come into the Southern territory while the demand for fabricated steel, wire and nails has been steady. The Tennessee company, subsidiary organization of the United States Steel Corporation, is putting a larger sized plate mill at its Bessemer rolling mills.

Cast-iron pipe plants are melting iron steadily and foundries and machine shops report business picking up slowly but surely.

Chicago

Aug. 29—Dullness continues in the iron market, though indications are more favorable to a revival of buying soon. The number of inquiries for first-half tonnage is increasing and larger amounts are being considered. For last-half deliveries the buying continues to be in small lots, at unchanged prices, $11@11.50, Birmingham, for Southern No. 2, or $15.35@15.85, Chicago; and $16.50@17 for Northern No. 2. The furnace interests continue to hold out for the higher quotations on 1911 business, though it is said in buying circles that heavy contracts could be made now at the lower prices. Few interests, however, on the buying side, care to close on large contracts for far-away delivery, though one large manufacturing concern has done so in the last week. This is encouraging, although the average melter is still buying closely—a carload to 400 or 500 tons and for delivery 30 to 90 days hence.

Light sales are the only ones made in iron and steel products, the nearest approach to activity being in wire goods. Coke is in somewhat better demand and no surplus exists on tracks, the price being $4.85, Chicago.

Cleveland

Aug. 29—Iron-ore shipments are falling off, and more boats are going out of commission. Something like 60,000 tons of resale ore is on the market, but no bids are reported.

Pig Iron—The market is still rather dull, but more inquiries are noted. Bessemer is quoted at $16.15; No. 2 foundry, $14.50@14.75; forge, $14@14.25; Lake Superior charcoal, $18.25@18.50, all Cleveland delivery.

Finished Material—The structural business is fair, with more contracts coming in. There is also a fair trade in both steel and iron bars. Plates are rather firm at 1.40c., Pittsburg basis. There is some cutting in sheets. Some good orders for sheets for the automobile trade have been canceled lately.

Philadelphia

Aug. 31—Sales of pig iron have been limited and have been mostly in small lots, of 1000 tons and under, for delivery in 30 to 60 days. Furnacemen are a little firmer in their views and are not as ready to make concessions as they were. Some inquiries for 1911 are in but have not resulted in sales, buyers apparently only testing the market. No. 2X foundry can be quoted at $16@16.25; No. 2 plain, $15.75@16; forge, $15; while $15 is asked for basic pig.

Steel Billets—Only small lots have been sold. Open-hearth billets are $27.50@28; forging billets, $29.50@30; but 50c. or $1 less can be done for good orders.

Bars—Iron bars are quiet and can be had as low as 1.40c. Steel bars are more active. Store trade is slower than it has been.

Sheets—Sales are still in small lots for early delivery. Forward orders are not talked about. Concessions of $1 or $2 per ton are easily obtained.

Plates—Specifications on contracts are coming in well, but new business is not large, though some good orders for tank and ship plates are reported under discussion. Makers are holding prices pretty well on small orders.

Structural Material—Some bridge work and several small building orders have been placed. Several good building contracts are forward, but have not yet been closed. Mills are not pushing for business as hard as they were.

Scrap—Dealers are overhauling their stocks, since such buyers as are in the market are rather captious about quality. Most buyers, however, are taking things quietly and holding off. A good-sized sale of old carwheels is reported at $14. Not much else in a selling way.

Pittsburg

Aug. 30—Steel manufacturers continue to report improvement in the demand for steel products, but the improvement is of a very moderate description and appears to amount to no more than the natural seasonable change attributable to the end of the midsummer period.

Prices of steel products are well held considering the general quietness, but are not overly strong. The leading steel interests appear to be adhering rigidly to 1.40c. as a minimum on bars, plates and shapes, but there are several mills cutting plates to 1.35c. Black sheets are subject to about $1 a ton more shading than a fortnight ago, the extreme con-

cession being $4 a ton, making a 2.20c. net price.

Reports are pretty uniform that the volume of new business in August will be well ahead of that in July, but, of course, July was a particularly poor month.

Pig Iron—A furnace in western Pennsylvania outside the Valleys has been making particularly low prices on basic iron, selling 1000 tons to a consumer taking a 45c. rate from this furnace but 60c. from the Valleys, at $14, delivered, and 1500 tons to a Pittsburg consumer, taking a 60c. rate from this furnace but 90c. from the Valleys, at $14.10 delivered. However, it is not certain that these prices can be duplicated. A sale of 1000 tons of bessemer was made last week at $15, and another lot of the same size sold this week at the same price, making a decline of 25c. On the large inquiries noted last week for pig iron, aggregating over 50,000 tons, chiefly basic, one interest has closed, the other two still being in negotiations. The concern which bought was the Oliver Chilled Plow Works, but details of the purchases cannot be ascertained here. Foundry iron is reported as a trifle firmer this week. A small lot of prompt Tennessee iron is offered on the basis of $10.50, Birmingham, 25c. lower than any price previously held, but the Birmingham district furnaces are understood to be still quoting $11, Birmingham. We quote, f.o.b. Valley furnaces, 90c. higher delivered Pittsburg: Bessemer, $15; basic, $13.75; No. 2 foundry, $14@14.25; forge, $13.35; malleable, $14.50 per ton.

Steel—Deliveries of unfinished steel have improved, but new business remains comparatively light. We quote, f.o.b. maker's mill, Pittsburg or Youngstown; Bessemer billets, $24.50; sheet bars, $25.50; open-hearth billets, $26; sheet bars, $26.50@27; rods, $28@29; forging billets, $29.50@30 per ton.

Ferromanganese—The ferromanganese market shows increased activity and slightly higher prices. Several sales of carload and slightly larger lots for prompt shipment have been made at $39.25 and $39.50, Baltimore, while there is inquiry for several hundred tons for the balance of this year and a larger tonnage for the first half of next year. English interests report fresh inquiries for 2000 or 3000 tons for American account and the foreign market appears stiffer. We quote prompt at $39.25@39.50 and forward deliveries at about $40, f.o.b. Baltimore, freight to Pittsburg being $1.95 per ton.

Sheets—While demand for sheets continues fairly heavy it is well below the capacity and sharp competition continues. Shading on black sheets has increased $1 a ton in the past fortnight, galvanized continuing to be shaded $5 a ton and blue annealed $1 a ton. Official or nominal prices are 2.40c. for black, 3.50c. for galvanized, $1.70 a square for painted corrugated roofing, $3 for galvanized corrugated, and 1.75c. for blue annealed, 10 gage.

St. Louis

Aug. 29—Very little change in the pig-iron market is noted this week. A small tonnage is moving. Inquiries are coming in fairly well and a slight improvement is anticipated. There has been no change in the price, $11.50@12 Birmingham and $15@15.75 per ton, f.o.b. St. Louis.

FOREIGN IRON TRADE

German Iron Production—The German Iron and Steel Union reports pig-iron production in June at 1,219,071 metric tons, being 42,664 tons less than in May. The daily average output dropped from 40,701 tons in May to 40,478 in June. For the six months ended June 30 the make of pig iron was, in metric tons:

	1909.	1910.	Changes.
Foundry iron	1,163,459	1,394,246	I. 230,787
Forge iron.....	351,520	331,068	D. 20,452
Steel pig.....	523,350	643,359	I. 120,009
Bessemer pig.....	201,027	252,210	I. 51,183
Thomas(basic)pig	4,013,133	4,581,149	I. 568,016
Total.....	6,252,489	7,202,032	I. 949,543

The total increase this year was 15.2 per cent. Steel pig includes spiegeleisen, ferromanganese and all similar alloys.

Belgian Production—The production of pig iron in Belgium for the half-year ended June 30 was: Foundry iron, 45,040; forge, 100,840; basic and bessemer, 761,340; total, 907,220 metric tons, an increase of 167,740 tons over last year.

METAL MARKETS

New York, Aug. 31—The metal markets generally are showing more activity. Changes in prices, however, are only fractional, but there is a better tendency.

Gold, Silver and Platinum

UNITED STATES GOLD AND SILVER MOVEMENT

Metal.	Exports.	Imports.	Excess.
Gold:			
July 1910..	$ 828,451	$10,282,649	Imp.$ 9,454,198
" 1909..	16,661,782	3,269,886	Exp. 13,391,896
Year 1910..	50,345,182	29,671,180	" 20,674,002
" 1909..	80,496,119	23,405,478	" 57,090,641
Silver:			
July 1910..	5,124,471	3,794,888	Exp. 1,329,583
" 1909..	5,049,366	3,916,117	" 1,133,249
Year 1910..	32,178,689	25,696,408	" 6,482,281
" 1909..	34,409,032	26,788,145	" 7,620,887

Exports from the port of New York, week ended Aug. 27: Gold, $400; silver, $808,791, chiefly to London. Imports: Gold, $911,693, nearly all from London; silver, $323,829, from Mexico, Central and South America.

Movement of gold and silver through the port of San Francisco, half-year ended June 30:

	Exports.	Imports.	Excess.
Gold.....	$1,970,208	$1,044,153	Ex. $ 926,055
Silver.....	3,356,100	1,033,722	Ex. 2,322,378

All the silver exported was bullion except $1500 in coin.

Exports of silver from London to the East from Jan. 1 to Aug. 18, reported by Messrs. Pixley & Abell:

	1909.	1910.	Changes.
India.....	£4,240,000	£4,062,100	I. £ 177,900
China.....	1,555,200	1,113,500	D. 441,700
Straits.....	82,800	.....	D. 82,800
Total.....	£5,878,000	£5,175,600	D. £ 702,400

India Council bills in London brought an average of 16.02d. per rupee for the week.

Gold—There was no special demand, and prices on the open market in London were steady at 77s. 9d. per oz. for bars and 76s. 5d. per oz. for American coin. In New York $800,000 in coin was shipped to Canada.

Platinum—The market is still quiet, and prices are unchanged at $33 per oz. for refined platinum and $37.50@38 per oz. for hard metal.

Our Russian correspondent reports, under date of Aug. 18, that the market is quiet, but generally unchanged. A slow increase is, however, to be marked at Ekaterinburg. The crude metal is quoted in St. Petersburg at 27,500@28,000 rubles per pood—average, $27.20 per oz.—and at Ekaterinburg at 7.50 rubles per zolotnik—$28.20 per oz. These prices are nominal, however, and subject to negotiations. The higher price at Ekaterinburg is unusual.

SILVER AND STERLING EXCHANGE

Aug.	25	26	27	29	30	31
New York....	52⅞	52⅞	52⅝	52⅛	52¾	52⅝
London	24⅜	24⅜	24⅜	24⅜	24⅜	24⅜
Sterling Ex..	4.8670	4.8665	4.8660	4.8645	4.8610	4.8615

New York quotations, cents per ounce troy, fine silver; London, pence per ounce, sterling silver, 0.925 fine.

Silver—The silver market after the decline has more tone, and under the influence of China and India purchases, has today shown considerable firmness. The outlook from India is good, and it would not be surprising if it forced an advance in silver during the coming fall months.

Copper, Tin, Lead and Zinc

Aug.	Copper. Lake, Cts. per lb.	Copper. Electrolytic, Cts. per lb.	Copper. London, £ per ton.	Tin. Cts. per lb.	Lead. New York, Cts. per lb.	Lead. St. Louis, Cts. per lb.	Zinc. St. Louis, Cts. per lb.
25	12⅝ @12⅞	12.50 @12.55	56¾	34¾	4.40	4.27½ @4.30	5.22½ @5.27½
26	12⅝ @12⅞	12.50 @12.55	56⅛	35⅛	4.40	4.27½ @4.32½	5.22½ @5.27½
27	12⅝ @12⅞	12.50 @12.55	....	35⅝	4.40	4.27½ @4.32½	5.22½ @5.27½
29	12⅝ @12⅞	12.50 @12.55	56	35⅝	4.40	4.27½ @4.32½	5.22½ @5.27½
30	12⅝ @12⅞	12.50 @12.55	56⅛	35⅝	4.40	4.27½ @4.32½	5.22½ @5.27½
31	12⅝ @12⅞	12.50 @12.55	55¾	35⅝	4.40	4.27½ @4.32½	5.22½ @5.27½

London quotations are per long ton (2240 lb.) standard copper. The New York quotations for electrolytic copper are for cakes, ingots and wirebars, and represent the bulk of the transactions made with consumers, basis New York, cash. The prices of casting copper and of electrolytic cathodes are usually 0.125c. below that of electrolytic. The quotations for lead represent wholesale transactions in the open market. The quotations on spelter are for ordinary Western brands; special brands command a premium.

Copper—During the week of Aug. 25-31, the market has been quiet, with neither any great demand from manufacturers nor pressure to sell from producers. There was a good business doing from day to day for export. European consumers are not well covered and the consumption both on the Continent and in England is increasing. Manufacturers in this country having covered their requirements for the next 30 days, have not been in the market in a large way. Some business has been done with them on the basis of 12¾c., delivered, 30 days, for electroyltic, netting about 12.60c., cash, New York, but the larger volume of business has been for delivery abroad and on this business producers have been willing to accept lower terms. However, if any large demand should develop, buyers would probably have to pay the full asking price maintained by all the agencies. Sales during the past week have been for September delivery and as far ahead as December, a small premium being asked and paid for the later deliveries. Business in Lake copper has been insignificant except for some that is done right along under contract.

Prices are practically unchanged and at the close Lake copper is quoted at 12⅝@12⅞, electrolytic copper in cakes, wirebars and ingots at 12.50@12.55. Casting copper is quoted nominally at 12¼@12½ for the week.

Copper sheets are 18@19c. base for large lots. Full extras are charged, and higher prices for small quantities. Copper wire is 14c. base, carload lots at mill.

The London market has been quiet but firm. On Monday it advanced to £56 for spot and £56 16d. 3s. for three months. There was some realization on the part of speculative holders. The market closes at £55 15s. for spot, and £56 12s. 6d. for three months.

Refined and manufactured sorts we quote: English tough, £58 5s.; best selected, £59 15s.@60 5s.; strong sheets, £67 15s.@68 15s. per ton.

Exports of copper from New York for the week were 6944 long tons. Our special correspondent gives the exports from Baltimore for the week at 2479 tons.

Tin—An old-fashioned speculation developed in the London market and produced the wide fluctuations which always accompany a similar movement. The high point was reached last Friday when at one period of the excitement £166 for spot and £160 15s. for future tin was quoted. Since then the market, while somewhat lower, has been strong on a more even basis. The close is cabled at £163 5s. for spot, and £159 5s. for three months.

The domestic market naturally was guided largely by the happenings in the London market. Consumers, suspicious of the rise abroad, are holding back and are covering their immediate wants only. They may, however, be induced to enter the market more freely if they find that the advance abroad is going to be maintained. At the close, September tin is quoted at about 35⅝ cents.

Lead—The market is somewhat firmer. Lead at New York is quoted at 4.40c., and at St. Louis, 4.27½@4.32½ cents.

In London, Spanish lead is unchanged at £12 11s. 3d. and English at £12 13s. 9d. per ton.

Spelter—During the last week the market has been rather active, several important consumers having been desirous of replenishing their supplies and being apparently urgent for prompt delivery. A rather large business has been done within the range of prices quoted. At the close some producers declined 5.27½c., St. Louis, and the outlook is generally considered to be good for a further advance in this metal. The market closes strong at 5.22½@5.27½c., St. Louis, and 5.37½@5.42½c., New York.

New York quotations for spelter Aug. 25 to 31, inclusive, were 5.37½@5.42½ cents.

In London, good ordinaries are quoted at £22 15s. and specials at £23 per ton.

Base price of zinc sheets is $7.50 per 100 lb., f.o.b. La Salle-Peru, Ill., less 8 per cent. discount.

The United Zinc and Chemical Company is reported to be making additions to its plant at Springfield, Illinois.

Other Metals

Aluminum—The market continues rather quiet and there is no change in prices. No. 1 ingots are quoted at 22½c. per lb. in large lots, New York delivery.

Antimony—Only a retail business is being done, and prices are unchanged at 8¼@8⅜c. per lb. for Cookson's; 7⅞@8c. for U. S., and 7¼@7⅜c. for outside brands.

Quicksilver—The market is rather quiet. In New York, quotations are unchanged at $46 per flask of 75 lb. for large lots; $47@48 for jobbing orders. San Francisco, $45.50 for domestic orders and $2 less for export. The London price is £8 12s. 6d. per flask, with £8 6s. 3d. quoted by second hands.

Nickel—Large lots, contract business, 40@45c. per lb. Retail spot, from 50c. for 500-lb. lots, up to 55c. for 200-lb. lots. The price for electroyltic is 5c. higher.

Magnesium—The price of pure metal is $1.50 per lb. for 100-lb. lots, f.o.b. New York.

Cadmium—Current quotations are 60@70c. per lb. in 100-lb. lots, f.o.b. New York, according to quality of metal.

Bismuth—The price of bismuth is now quoted by Johnson & Matthey, who handle it in England, at 7s. 6d.—$1.80—per lb. in London.

Zinc and Lead Ore Markets

Joplin, Mo., Aug. 27—The highest price paid for zinc sulphide ore was $45 per ton, on a base price of $42 per ton of 60 per cent. zinc. The highest base price was $43.50 for ores carrying 4 to 5 per cent. of iron, and $47 base for ores carrying an excess of 10 per cent. of iron. Zinc silicate sold on a base of $20@23 per ton of 40 per cent. zinc. The average price, all grades of zinc, was $37.92. Lead opened the week unusually firm at $52 and closed with $55 paid for several bins of ore. The average price, all grades of lead, was $51.70 per ton.

The advancing spelter market resulted

SHIPMENTS, WEEK ENDED AUG. 27.

	Zinc, lb.	Lead lb.	Value.
Webb City-Carterville	4,997,020	829,970	$121,518
Joplin	2,131,410	215,840	52,306
Galena	1,139,060	81,650	24,903
Alba-Neck	893,000	.....	19,646
Duenweg	541,790	70,580	1,191
Miami	850,630	.....	10,632
Jackson	285,270	119,580	8,694
Oronogo	314,140	.....	6,370
Granby	480,820	9,500	5,350
Quapaw	321,480	15,860	5,218
Aurora	391,790	.....	4,853
Carthage	225,810	.....	4,741
Spurgeon	356,000	17,250	4,670
Carl Junction	214,640	.....	4,507
Sarcoxie	205,590	.....	4,215
Cave Springs	150,370	4,180	3,104
Badger	140,880	2,230	2,873
Reeds	62,690	.....	944
Greenfield	59,640	.....	566
Totals	13,762,030	1,366,640	$296,301
8 months	387,248,990	56,889,840	$9,951,822
Zinc value, the week,	$260,965;	8 mos.,	$7,595,257
Lead value, the week,	35,336;	8 mos.,	1,456,565

MONTHLY AVERAGE PRICES.

Month.	Zinc Ore. Base Price.		Zinc Ore. All Ores.		Lead Ore. All Ores.	
	1909.	1910.	1909.	1910.	1909.	1910.
January	$41.25	$47.31	$38.46	$45.16	$52.17	$56.99
February	36.94	40.69	34.37	39.47	50.50	53.64
March	37.40	43.60	34.71	39.71	50.82	51.26
April	38.63	41.00	37.01	39.33	55.63	49.72
May	40.06	40.19	37.42	37.51	56.59	48.16
June	44.15	40.20	40.35	37.83	57.52	48.80
July	43.06	39.63	41.11	36.80	53.74	48.59
August	48.25	40.13	44.54	37.32	57.60	49.76
September	47.70	.....	44.87	.....	56.11	.....
October	49.50	.....	45.75	.....	55.02	.....
November	51.31	.....	48.29	.....	53.94	.....
December	49.45	.....	47.57	.....	55.26	.....
Year	$43.98	.....	$41.20	.....	$54.60	.....

NOTE—Under zinc ore the first two columns give base prices for 60 per cent. zinc ore; the second two the average for all ores sold. Lead ore prices are the average for all ores sold.

in quick returns to the zinc ore producers by two weeks of successive advances in prices. While pig lead shows no present upward action, buyers have been unusually busy the past fortnight picking up all the ore available, and in order to secure it have advanced the price from $49 for 11 successive weeks to $55 in two weeks.

Platteville, Wis., Aug. 27—The base price paid this week for 60 per cent. zinc ore was $40@40.50 per ton; no premium reported. The highest price paid for lead ore was $53; the base price, 80 per cent. lead, was $51 per ton.

SHIPMENTS, WEEK ENDED AUG. 27.

Camps.	Zinc ore, lb.	Lead ore, lb.	Sulphur ore, lb.
Galena	675,045	.....	.....
Platteville	509,740	.....	485,000
Mineral Point	344,600	.....	.....
Benton	219,000	.....	.....
Highland	193,700	69,900	.....
Cuba City	83,500	125,035	327,700
Montfort	.....	82,000	.....
Shullsburg	.....	87,000	.....
Total	2,025,585	363,935	812,700
Year to date	59,877,041	6,160,289	16,059,210

In addition to the above there was shipped during the week to the separating plants, 2,452,926 lb. zinc concentrates.

New Caledonia Ore Exports

Exports of nickel ore from New Caledonia in May are reported by the *Bulletin du Commerce*, of Noumea, at 16,041 metric tons; for the five months ended May 31 at 43,310 tons. Exports of chrome ore were 12 tons in May and 6450 tons for the five months.

Other Ore Markets

Iron Ore—Current quotations for Lake Superior ores, on dock at Lake Erie ports, are: Bessemer ore—base 55 per cent. iron and under 0.45 phosphorus—$5 per ton for Old Range and $4.75 for Mesabi; nonbessemer—base 51.5 per cent. iron—$4.20 for Old Range and $4 for Mesabi.

In the East there is no organization of sellers, and a wide range of prices exists, according to quality and location of mines. A good nonbessemer ore, around 50 to 55 per cent. iron, can be had at $3@3.50 per ton, f.o.b. mines; but no general quotations can be given.

Manganese Ore—The base price, as fixed by the large buyers, is 25c. per unit for manganese and 5c. per unit for iron content, for a base ore containing 49 per cent. or over in manganese, not over 0.20 phosphorus and 8 per cent. silica. Prices range down to 23c. per unit for 40 per cent. manganese; with deductions for excess of phosphorus and silica.

Pyrites—Domestic furnace sizes fetch 11@11½c. per unit, delivered at Eastern acid works; fines, 10¾@11c. Pyrites containing arsenic realize from ½@1½c. per unit less.

Tungsten Ore—Ferberite, wolframite and huebnerite ores, $6.50@7 per unit per ton of 2000 lb. for ore containing 60 per cent. of tungsten trioxide. For scheelite ores, 50c.@$1.50 per unit less.

Zinc Ore—For Rocky Mountain blende, of good quality, especially as to iron and lead content, delivered at Kansas smelting points, the current price is for the zinc content, less eight units, at the St. Louis price for spelter, less $14@15 per 2000 lb. of ore. See also Joplin and Wisconsin ore markets.

CHEMICALS

New York, Aug. 31—The chemical market is still inactive and although some inquiries are being heard in different lines, prices are unchanged.

Copper Sulphate—Quotations remain at $4 per 100 lb. for carload lots and $4.25 per 100 lb. for smaller parcels.

Arsenic—The price for white arsenic is $2.25 per 100 lb. in a large way. Inquiries are frequent.

Nitrate of Soda—Prices are still 2.10c. per lb. for spot, while futures are held at 2.12½@2.15c. The market is very dull, considering the time of year.

Potash Salts—It is reported that a deposit of potash salts has been discovered in Austria, near Kalusz in Galicia. It is said that arrangements are being made to explore these deposits and to work them if they are found to be of sufficient extent.

Petroleum

Petroleum production and deliveries in July, as reported by the *Oil and Gas Journal*, in barrels of 42 gal. each:

Fields.	Production.	Deliveries.
Pennsylvania	2,713,345	6,002,463
Illinois	2,638,253	1,332,242
Mid-Continent	4,697,801	4,837,260
Gulf Coast	1,100,361	1,969,096
California	6,903,804	5,100,000
Totals	18,053,571	19,241,170

Total estimated stocks held by pipe lines and producers Aug. 1, were 130,926,436 bbl., an increase of 685,262 bbl. in July.

MINING STOCKS $

New York, Aug. 31—The general stock market has been unsettled and inclined to be weak on rather light trading. Toward the close of the week there was a little better tendency and some advances in price, as in Amalgamated Copper and Steel common.

On the Curb there was an improvement in Goldfield Consolidated, but not much was heard of the other Nevada stocks. Cobalt stocks were fairly steady on light trading. The copper shares were not in great demand. Chino was the leader, with a slight gain at the close.

It is reported that negotiations have been renewed for the proposed consolidation of the Comstock lode companies, which has been under discussion for several months.

Boston, Aug. 30—Although little has happened in the copper-share market the past week, sentiment is optimistic. Concerted action could bring about a fair sized upward movement in the metal stocks if leadership could be drawn upon, but the latter is lacking.

Calumet & Hecla holds at its top price around $560, which gives encouragement to those who study the situation. Aside from this the company has declared a $7 dividend, the same as three months ago. Other mining-dividend declarations during the week have been the regular $1.25 by the Quincy, $1 by Calumet & Arizona, and 50c. by the Goldfield Con-

COPPER PRODUCTION REPORTS.
Copper contents of blister copper, in pounds.

Company.	May.	June.	July.
Arizona, Ltd.	2,610,000	2,802,000	2,910,000
Balaklala	1,148,762	1,226,000	1,100,000
Boleo (Mexico)	2,735,680	2,115,314	2,272,600
Copper Queen	10,283,855	10,219,687	10,730,372
Calumet & Ariz.	1,778,000	2,490,000	2,705,000
Cananea (Mexico)	4,300,000	4,280,000	4,500,000
Detroit	2,035,639	2,017,000	1,800,000
Imperial	700,000	800,000	.....
Nevada Con	6,164,493	6,186,832	6,896,429
Old Dominion	2,174,000	2,092,000	.....
Shannon	1,326,000	1,528,000	2,207,000
Superior & Pitts.	2,276,000	2,245,000	2,224,000
Utah Copper Co.	8,862,913	8,358,496	8,677,000
Butte District	24,850,000	23,750,000	.....
Lake Superior	19,250,000	18,000,000	19,000,000
Total production.	90,495,342	88,130,329	.....
Imports, bars, etc.	24,850,919	20,817,978	.....
Imp. in ore & matte	6,487,243	5,579,618	.....
Total	121,833,504	114,527,915	.....

Butte district and Lake Superior figures are estimated; others are reports received from companies. Imports duplicate production of Cananea, and that part of Copper Queen production which comes from Nacozari. Boleo copper does not come to American refiners. Utah Copper report includes the output of the Boston mill.

STATISTICS OF COPPER.

Month.	United States Product'n.	Deliveries, Domestic.	Deliveries for Export.
VIII, 1909	120,597,234	59,614,207	48,382,704
IX	118,023,139	52,105,955	50,077,777
X	124,657,709	66,359,617	56,261,238
XI	121,618,369	66,857,873	55,266,595
XII	117,828,655	69,519,501	59,546,570
Year	1,405,403,056	705,051,591	680,942,620
I, 1910	116,547,287	78,158,387	81,691,672
II	112,712,493	66,618,322	37,369,518
III	120,067,467	62,944,818	40,585,767
IV	117,477,639	67,985,951	31,332,434
V	123,242,476	59,305,222	45,495,400
VI	127,219,188	53,363,196	65,895,948
VII	118,370,003	56,708,175	59,407,167

	Visible Stocks.		
	United States.	Europe.	Total.
VIII, 1909	122,596,607	171,492,160	294,088,767
IX	135,196,930	197,993,600	333,190,530
X	151,472,772	210,224,000	361,696,772
XI	153,509,626	222,566,400	376,076,026
XII	153,003,527	236,857,600	389,861,127
I, 1910	141,766,111	244,204,800	385,970,911
II	98,463,339	248,236,800	346,700,139
III	107,187,992	254,150,400	361,338,392
IV	123,824,874	249,625,600	373,450,474
V	141,984,159	246,870,400	388,854,559
VI	160,425,973	239,142,400	399,568,373
VII	168,386,017	232,892,800	401,278,817
VIII	170,640,678	222,320,000	392,960,678

Figures are in pounds of fine copper. U. S. production includes all copper refined in this country, both from domestic and imported material. Visible stocks are those reported on the first day of each month, as brought over from the preceding month.

solidated, a part of the latter being in the way of extra. All of these are at the same rates as prevailed three months ago.

Trading for the most part has been desultory, although it is to be noted that there is quite a demand for odd lots of all the active issues. A premature report has been spread of another Lake Superior consolidation to take in the Lake, North Lake, Indiana, South Lake, Algomah and Bohemia. It is termed another Copper Range deal. The three latter stocks are Curb stocks, while the three former are listed on the regular Exchange. Their combined market value is around $11,000,000. Indiana and South Lake have both had good market movements, but they have been due to favorable findings by diamond-drill operations in each.

Assessments

Company.	Delinq.	Sale.	Amt.
American, Ida	Sept. 22	Oct. 15	$0.002
Bullion, Nev	Aug. 11	Sept. 12	0.05
Challenge, Nev	Sept. 7	Sept. 28	0.10
Ely Con., Nev	.....	Oct. 10	0.05
Hancock Con., Mich	Au.Oct.	.....	3.00
Hypothek, Ida	Sept. 12	Oct. 8	0.005
Julia, Nev	Aug. 6	Sept. 6	0.03
Little Butte, Ida	Sept. 15	Oct. 13	0.002
Live Oak, Ariz	Oct. 1	.....	3.00
Lower Mammoth, Utah	Aug. 15	.....	0.05
Montana-Bingham, Utah	Aug. 10	.....	0.02
New York, Utah	Aug. 15	.....	0.02
Opex, Utah	Aug. 29	.....	0.03
Potosi G. & S. Min, Nev	Sept. 6	Sept. 28	0.10
Raven, Mich	Aug. 15	.....	0.10
Rhode Island, Ida	Sept. 14	Oct. 14	0.001
Scorpion, Nev	Aug. 11	Sept. 6	0.02
Scottish Chief, Utah	Aug. 10	.....	0.01
Seg. Belcher & Midas Con., N.	Sept. 6	Sept. 27	0.05
Tintic Central, Utah	Aug. 10	.....	0.00½
Utah, Nev	Sept. 6	Sept. 27	0.05
Winona, Mich	Aug. 9	.....	1.00

Monthly Average Prices of Metals

SILVER

Month.	New York.		London.	
	1909.	1910.	1909.	1910.
January	51.750	52.375	23.843	24.154
February	51.472	51.534	23.706	23.794
March	50.468	51.454	23.227	23.690
April	51.428	53.221	23.708	24.483
May	52.905	53.870	24.343	24.797
June	52.538	53.462	24.166	24.651
July	51.043	54.150	23.519	25.034
August	51.125	52.912	23.588	24.428
September	51.440	.....	23.743	.....
October	50 923	.....	23.502	.....
November	50.703	.....	23.351	.....
December	52.226	.....	24.030	.....
Total	51.502	.....	23.706	.....

New York, cents per fine ounce; London, pence per standard ounce.

COPPER.

	New York.				London.	
	Electrolytic		Lake.			
	1909.	1910.	1909.	1910.	1909.	1910.
January	13.893	13.620	14.280	13.870	61.198	60.923
February	12.949	13.332	13.295	13.719	57.688	59.388
March	12.387	13.255	12.826	13.586	56.231	59.214
April	12.56½	12.733	12.93⅜	13.091	57.363	57.238
May	12.893	12.550	13.238	12.885	59.338	56.313
June	13.214	12.404	13.548	12.798	59.627	55.310
July	12.880	12.215	13.363	12.570	58.556	54.194
August	13.007	12.490	13.296	12.715	59.393	55.733
September	12.870	.....	13.210	.....	59.021	.....
October	12.700	.....	13.030	.....	57.551	.....
November	13.125	.....	13.354	.....	58.917	.....
December	13.298	.....	13.647	.....	59.906	.....
Year	12.982	.....	13.335	.....	58.732	.....

New York, cents per pound. Electrolytic is for cakes, ingots or wirebars. London, pounds sterling, per long ton, standard copper.

TIN AT NEW YORK

Month.	1909.	1910.	Month.	1909.	1910.
January	28.060	32.700	July	29.125	32.695
February	28.290	32.920	August	29.966	33.972
March	28.727	32.463	September	30.293	.....
April	29.445	32.976	October	30.475	.....
May	29.225	33.125	November	30.859	.....
June	29.322	32.769	December	32.913	.....
			Av. Year	29.725	.....

Prices are in cents per pound.

LEAD

Month.	New York.		St. Louis.		London.	
	1909.	1910.	1909.	1910.	1909.	1910.
January	4.175	4.700	4.025	4.582	13.113	13.650
February	4.018	4.613	3.868	4.445	13.313	13.328
March	3.986	4.459	3.835	4.307	13.438	13.063
April	4.168	4.376	4.051	4.225	13.297	12.641
May	4.287	4.315	4.214	4.164	13.225	12.550
June	4.350	4.343	4.291	4.207	13.031	12.688
July	4.321	4.404	4.188	4.291	12.563	12.531
August	4.363	4.400	4.227	4.290	12.475	12.513
September	4.342	.....	4.215	.....	12.781	.....
October	4.341	.....	4.215	.....	13.175	.....
November	4.370	.....	4.252	.....	13.047	.....
December	4.560	.....	4.459	.....	13.125	.....
Year	4.273	.....	4.153	.....	13.049	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

SPELTER

Month.	New York.		St. Louis.		London.	
	1909.	1910.	1909.	1910.	1909.	1910.
January	5.141	6.101	4.991	5.951	21.425	23.350
February	4.889	5.569	4.739	5.419	21.562	23.188
March	4.757	5.637	4.607	5.487	21.438	23.031
April	4.965	5.439	4.815	5.289	21.531	22.469
May	5.124	5.191	4.974	5.041	21.975	22.100
June	5.402	5.128	5.252	4.978	22.000	22.219
July	5.402	5.152	5.252	5.002	21.969	22.406
August	5.729	5.279	5.579	5.129	22.125	22.800
September	5.796	.....	5.646	.....	22.906	.....
October	6.199	.....	6.043	.....	23.200	.....
November	6.381	.....	6.231	.....	23.188	.....
December	6.249	.....	6.099	.....	23.094	.....
Year	5.503	.....	5.352	.....	22.201	.....

New York and St. Louis, cents per pound. London, pounds sterling per long ton.

PRICES OF PIG IRON AT PITTSBURG.

	Bessemer.		Basic.		No. 2 Foundry.	
	1909.	1910.	1909.	1910.	1909.	1910.
January	$17.18	$19.90	$16.40	$17.98	$16.26	$17.94
February	16.73	18.96	16.09	17.21	15.90	17.38
March	16.40	18.53	15.84	16.93	15.62	17.00
April	15.79	18.28	15.05	16.84	15.06	16.75
May	15.77	17.10	15.02	15.94	15.08	16.18
June	16.13	16.52	15.84	15.60	15.63	15.53
July	16.40	16.40	15.90	15.40	15.96	15.40
August	17.16	16.09	16.17	14.89	16.20	15.16
September	18.44	.....	16.80	.....	17.03	.....
October	19.75	.....	17.84	.....	18.02	.....
November	19.90	.....	18.37	.....	18.09	.....
December	19.90	.....	18.15	.....	17.90	.....
Year	$17.46	.....	$16.46	.....	$16.40	.....

STOCK QUOTATIONS

COLO. SPRINGS Aug. 30

Name of Comp.	Bid.
Listed:	
Acacia	.05⅝
Cripple Cr'k Con.	.02½
C. K. & N.	.17
Doctor Jack Pot	.10
Elkton Con	.74
El Paso	.84½
Fannie Rawlins	‡.05½
Findlay	.09½
Gold Dollar	‡.14
Gold Sovereign	.03½
Isabella	.18½
Mary McKinney	‡.53
Pharmacist	.03
Portland	1.17
Vindicator	.90
Work	.04
Unlisted:	
Golden Cycle	2.30
United Gold Mines	‡.07½

SALT LAKE Aug. 30

Name of Comp.	Clg.
Carisa	.19
Colorado Mining	.40
Columbus Con	.84
Daly Judge	4.00
Grand Central	1.22½
Iron Blossom	.88
Little Bell	.17
Little Chief	.22
Lower Mammoth	‡.15
Mason Valley	‡.50
Maj. Mines	‡.53
May Day	.05
Nevada Hills	2.17½
New York	‡.13
Prince Con	.60
Red Warrior	6.00
Silver King Coal'n	2.00
Sioux Con	.24
Uncle Sam	.19
Victoria	1.07½

SAN FRANCISCO. Aug.30.

Name of Comp.	Clg.	Name of Comp.	Clg.
COMSTOCK STOCKS		MISC. NEVADA	
Alta	.11	Belmont	3.85
Belcher	.93	Daisy	.04
Best & Belcher	.50	Jim Butler	.27
Caledonia	.46	MacNamara	.27
Challenge Con	.18	Midway	.24
Chollar	.20	North Star	.08
Confidence	.75	West End Con	.61
Con. Cal. & Va	1.37	Atlanta	.12
Crown Point	.97	Booth	.11
Exchequer	.20	C.O.D. Con	.11
Gould & Curry	.26	Columbia Mt.	‡.07
Hale & Norcross	.35	Comb. Frac	.44
Mexican	1.35	Great Bend	.03
Ophir	1.37	Jumbo Extension	.42
Overman	.65	Oro	.06
Potosi	.35	Red Hill	.04
Savage	.22	Sandstorm	.04
Sierra Nevada	.30	Silver Pick	.07
Union Con	.39	St. Ives	.18
Yellow Jacket	.64	Tramps Con	.03

N. Y. EXCH. Aug. 30

Name of Comp.	Clg.
Amalgamated	64⅝
Am. Agri. Chem	44¾
Am.Sm.&Ref.,com	68
Am. Sm. & Ref., pf.	103
Anaconda	40
Bethlehem Steel	‡27½
Col. & Hock. C. & I.	5¾
Colo. Fuel & Iron	30
Du Pont P'd'r, pf.	‡84¾
Federal M. & S.	‡55
Great Nor., ore ctf.	‡54
Nat'nalLead,com.	52½
National Lead, pf.	‡100½
Nev. Consol.	20¾
Pittsburg Coal	16¾
RepublicI&S,com.	30
Republic I & S, pf.	91
SlossSheffi'd,com.	57¾
Sloss Sheffield, pf.	‡103
Tennessee Copper	26¼
Utah Copper	45¾
U. S. Steel, com	70
U. S. Steel, pf	116½
Va. Car. Chem	58

N. Y. CURB Aug. 30

Name of Comp.	Clg.
Bonanza Creek	3
Boston Copper	18
Braden Copper	3½
B. C. Copper	4⅞
Buffalo Mines	2¼
Butte Coalition	19½
Caledonia	¾
Chino	14⅜
Cobalt Central	8½
Cobalt Prov	59
Con. Ariz. Sm	2
Cumberland Ely	9
Davis-Daly	1¼
Dominion Cop	7
Ely Con	.30
El Rayo	3¾
Florence	2¼
Gila Copper	5
Giroux	6⅜
Gold Hill	⅝
Goldfield Con	8⅛
Greene Cananea	7⅛
Guanajuato	1⅝
Guggen. Exp	180
Kerr Lake	6¾
La Rose	3⅛
McKinley-Dar-Sa	1.01
Miami Copper	19¼
Mines Co. of Am.	54
Mont. Shoshone	.37½
Mont.-Tonopah	.98
Nev. Utah M. & S.	⅛
New Baltic	5
Newhouse M. & S.	3½
Nipissing Mines	10⅝
Ohio Copper	2⅛
Pacific Sm. & M.	⅛
Ray Central	2⅛
Ray Con	‡18⅛
Silver Queen	.35
Standard Oil	600
Stewart	⅛
Tonopah	8⅞
Tonopah Ex	.90
Tri-Bullion	⅛
W. Va. Wyo. Cop.	2⅛
Yukon Gold	3⅞

LONDON Aug. 31

Name of Com.	Clg.
Dolores	£1 10s 0d
Stratton'sInd.	0 3 3
Camp Bird	1 13 10½
Esperanza	2 13 9
Tomboy	0 16 3
El Oro	1 7 0
Oroville	‡0 5 9
Mexico Mines	8 18 0

BOSTON EXCH. Aug. 30

Name of Comp.	Clg.
Adventure	6
Allouez	40
Am. Zinc	26
Arcadian	5¼
Arizona Com	17
Atlantic	5¾
Boston Con	18
Butte & Balak	6¾
Calumet & Ariz	60½
Calumet & Hecla	560
Centennial	18
Con. Mercur	.10
Copper Range	66½
Daly-West	6¼
East Butte	7¾
Franklin	10
Granby	34
Hancock	21
Helvetia	‡2½
Indiana	18⅞
Isle Royale	19
Keweenaw	3¾
Lake	36¾
La Salle	10
Mass	7¼
Michigan	4½
Mohawk	47½
Nevada	20⅝
North Butte	28¼
North Lake	10
Ojibway	6
Old Dominion	36
Osceola	125
Parrot	13½
Quincy	74
Shannon	10
Superior	45½
Superior & Bost	8¾
Superior & Pitts	11½
Tamarack	57
Trinity	6
U. S. Smg. & Ref	38¾
U.S.Sm. & Re., pd.	49
Utah Apex	3¾
Utah Con	24
Victoria	2½
Winona	7½
Wolverine	125
Wyandotte	1¾

BOSTON CURB Aug. 30

Name of Comp.	Clg.
Ahmeek	185
Bingham Mines	3½
Boston Ely	1⅛
Boswyocolo	.08
Cactus	1⅛
Calaveras	10¾
Champion	.05½
Chemung	8¾
Chief Cons	1⅛
Cons. Ariz	2¼
Corbin	6⅜
Crown Reserve	2⅛
First Nat. Cop	3¾
Inspiration	8⅞
Mackinaw	.12
Majestic	.49
Nat'l Mine	.11
Nevada-Douglas	2⅛
Oneco	2¾
Raven Copper	.30
Rhode Island Coal	7½
San Antonio	7⅛
Shattuck-Ariz	22
South Lake	9¼
Superior & Globe	.20
Trethewey	1⅜
Tuolumne Copper	2¾
Vulture	9⅜
Yuma	.42

‡Last quotation.

THE MINING INDEX

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COAL AND COKE

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ECONOMIC GEOLOGY—GENERAL

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MINING GENERAL

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CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

ABRASIVES—

Carbons, good drill quality, carat		$50.00@75.00
Carborundum, f.o.b. Niagara Falls, powd.	lb.	.08
Grains	"	.10@.17
Corundum	"	.07@.10
Crushed Steel, f.o.b. Pittsburg	"	.05½@.06
Emery, in kegs; Turkish flour	"	.01½@.02
Grains	"	.03½@.04
Naxos flour	"	.01½@.02
Grains	"	.03½@.04
Chester flour	"	.01½@.02
Grains	"	.03½@.04
Peekskill flour, f.o.b. Easton, Pa.	"	.01½@.01¾
Grains, in kegs	"	.02¾@.03
Garnet, per quality	sh. ton.	25.00@35.00
Pumice Stone, Am. Powd.	100 lb.	1.60@2.00
Italian, powdered	per lb.	.01¾@.01¾
Lump, per quality	"	.03½@.30
Rottenstone, ground	"	.02@.04
Lump, per quality	"	.05@.20
Rogue, per quality	"	.05@.30
Steel Emery, f.o.b. Pittsburg	"	.07½@.07¾

ACIDS—

Acetic 28%	lb.	.02
Boric	"	.07
Hydrofluoric, 30%	"	.02¾@.03½
" 48%	"	.06
" 52%	"	.06½
" 60%	"	.10
Hydrochloric acid, 20° per 100 lb.		1.25@1.50
Nitric acid, 36° to 40°	per lb.	.03½@.04½
Sulphuric acid, 50°, bulk	per ton.	$12 up
60°, 100 lb. in carboys.		.85@1.12½
60°, bulk, ton		16.00@18.00
66°, 100 lb. in carboys.		1.00@1.10
66°, bulk, ton		18.00
Oxalic	per lb.	.07½@.07¾

ALCOHOL—

Grain 95%	gal.	2.52@2.55
Denatured	"	.42
Refined wood, 95@97%	"	.52@.57

ALUM—

Lump	100 lb.	$1.75
Ground	"	1.85
Chrome Alum	"	.04½@.05

ALUMINUM—

Sulphate, com'l.	lb.	1.50@2.00

AMMONIA—

24 deg. lb.	"	.04½@.05½
26 deg. lb	"	.04¾@.05¾

AMMONIUM—

Bromide	lb.	.28
Carbonate	"	.08@.08½
Muriate grain	"	.05½@.06½
Lump	"	.09½@.09½
Sulphate, 100 lb.	"	2.75@3.00
Sulpho-cyanide com.	"	.25
" " chem. pure	"	.35

ANTIMONY—

needle, lump	lb.	.04½@.05
Oxide	"	.07¼@.08

ARSENIC—

white	"	.02½
Red, Outside brands	"	.06½@.07
Saxony	"	.07@.07½

ASPHALTUM—

Barbadoes	per ton.	80.00@120.00
West Indies	"	30.00@60.00
Egyptian	lb.	25@.30
Gilsonite, Utah ordinary	per ton.	32.00@40.00
Trinidad	"	20.00@30.00
California	per ton.	25.00@30.00

BARIUM—

Carb. Lump. 80@90%	lg. ton.	26.00@35.00
Precipitated, 96@98%	"	33.00@35.00
Powdered, natural	lb.	.02@.02½
Chloride com'l	ton.	32.00@35.00
Nitrate powdered, in casks	lb.	.05@.06½
Blanc Fixe, dry, bbl	per lb.	.02½@.04

BARYTES—

Am. Ground	sh. ton.	12.00@15.00
Floated	"	17.00@19.00
Foreign floated	"	20.00@23.00

BLEACHING POWDER—35%

100 lb.		1.20@1.25

BLUE VITRIOL—(copper sulphate), carload, per 100 lb. 4.00@4.25

BONE ASH—lb. .02½@.04

BORAX, sacks—" .03¾@.05

CALCIUM—

Acetate, gray	100 lb.	2.00@2.05
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh. ton.	65.00
Chloride, f.o.b. N. Y.	"	11.00@14.10

CEMENT—Slag cement—bbl. .75@1.25

Portland, Am. 500 lb	"	1.50@1.60
Foreign	"	2.25@2.90
"Rosendale," 300 lb.	"	.85
(in sacks)	"	.65

CHROME ORE—

New Caledonia 50% ex. ship N. Y.	per lg. ton.	14.00@16.00
Bricks, f.o.b. Pittsburg, per M.		175.00

CLAY, CHINA—

Am. common ex-dock, N. Y.	ton.	8.00@9.00
Foreign	"	11.50@18.00

COBALT—Oxide—lb. .80@.85

COPPERAS—

Bulk	100 lb.	$0.55
In bbls.	"	.65@.80
In bags	"	.60@.75

CRYOLITE (carload)—lb. .06½@.07

FELDSPAR—Ground—sh. ton. 6.00@14.00

FIRE BRICK—

American	per M.	30.00@40.00
Imported	"	30.00@45.00
St. Louis	"	16.00
Extra	"	20.00@23.00
Special extra	"	30.00@35.00

FIRE CLAY—F.o.b. St. Louis.

St. Louis, extra quality	per ton.	5.00
" ordinary	"	2.50

FLUORSPAR—

Domestic f.o.b. Pittsburg:		
Lump	ton.	8.00@10.00
Ground	"	12.00@14.00
Foreign crude ex. dock	"	8.50

FULLER'S EARTH—

Lump	100 lb.	.80@.85
Powdered	"	.80@.85

GRAPHITE—Ceylon.

Flying dust, finest to best	lb.	.02@.04
Dust	"	.02½@.05
Chip	"	.04@.08
Lump	"	.05½@.12
Large lump	"	.08½@.10½

GYPSUM—

Fertilizer	sh. ton.	5.00
Ground	"	4.00@7.00

INFUSORIAL EARTH—

Ground Am. Best	lb.	.01½@.02½
German	"	.02½@.02¾

LEAD—Acetate (sugar of) brown, lb. .07¾@.09½

Nitrate, com'l	"	.08¼

MAGNESITE—Greece.

Crude (95%)	lg. ton.	7.50@8.50
Calcined, powdered	sh. ton.	26.00@37.00
Brick, domes, per qual. f.o.b. Pittsburg	M.	160@200

MAGNESIUM—

Chloride, com'l	100 lb.	.90@1.25
Sulphate (Epsom salt)	100 lb.	.90@1.00

MANGANESE—

Foreign, crude, powdered:		
70@75% binoxide	lb.	.01@.01½
75@85% binoxide	"	.01½@.01¾
85@90% binoxide	"	.01½@.04
90@95% binoxide	"	.06½
Ore, 80%-85%	sh. ton.	16.00@32.50

MARBLE—Flour—sh. ton. 7.00@9.00

MINERAL WOOL—

Slag, ordinary	sh. ton.	19.00
Selected	"	25.00
Rock, ordinary	"	32.00

MONAZITE SAND—

Guar. 97%, with 5% Thorium oxide, normal	lb.	.08 and up

NICKEL—

Oxide, crude, lb. (77%) for fine metal contained		.47
Sulphate, single	lb.	.10½@.11
Sulphate, double	"	.05½@.08

NITRATE OF SODA—

100 lb. 95%		2.10
95% for 1910		2.12½@2.15

96% is 2½@7½c. higher per 100 lb.

OZOKERITE—best—lb. .14@.17

PAINTS AND COLORS—

Litharge, Am. powdered	lb.	.05½@.06½
English glassmakers'	"	.08½@.09½
Lithophone	"	.03½@.07
Metallic, brown	sh. ton.	16.50@30.00
Red	"	14.00@18.00
Ocher, Am. common	"	10.00@15.00
Best	"	12.00@15.00
Dutch, washed	lb.	.02½@.03
French, washed	"	.01½@.02
Paris green, pure, bulk	"	.17½@.20½
Red lead, American	"	.06½@.07
Foreign	"	.08¼@.09½
Turpentine, spirits bbl., per gal.		.73½
White lead, Am., dry	lb.	.05½@.06½
American, in oil	"	.07@.07½
Foreign, in oil	"	.09@.09½
Zinc white, Am. extra dry	"	.05⅝@.06⅛
French, proc's, red seal, dry	"	.07½@.08
French, process, green seal, dry	"	.10@.10½

PHOSPHATES—Acid—.55@60c. per unit

*Fla., hard rock 77%		6.00@6.50
land pebble 68%		3.75@4.00
†Tenn., 78@80%		5.00@5.50
75%		4.75@5.00
68@72%		4.25@4.50
‡So. Car. land rock 60%		3.50@4.00

*F.o.b. Florida or Georgia ports. †F.o.b. Mt. Pelasant. ‡On vessel Ashley River, S. C.

POTASSIUM—

Bicarbonate crystal	lb.	$.078
Powdered or granulated	"	.0½
Bichromate, Am.	"	.07½@.08
Scotch	"	.10½
Bromide	"	.20
Carbonate (80@85%)	"	.03½@.04½
Caustic, ordinary	"	.03¾@.05¾
Elect. (90% KOH)	"	.05½@.06
Chloride (muriate), 100 lb.		1.90
Chlorate, powdered	"	.08½@.09½
Crystals	"	.09@.09¾
Cyanide (98@99%)		
Carloads (30,000 lb.)	"	18c.
5-ton lots		18½c.
Less than 5 tons		.19
Kainite, long ton, bulk, 7.50; bags,		9.25
Permanganate	lb.	.09½@.10½
Prussiate, yellow	"	.13@.13½
Red	"	.29@.32
Sulphate (basis 90%)	100 lb.	2.18@2.21

PYRITE—

Domestic, non-arsenical, furnace size, f.o.b. R. R.	per unit.	11@11½c.
Domestic, non-arsenical, fines, per unit, f.o.b. mines		10¾@11c.
Imported, non-arsenical, furnace size, ex-ship, per unit		.12½@.13
Imported, arsenical, furnace size, ex-ship, per unit		.12@.12⅝
Imported fines, arsenical, ex-ship, per unit		.09@.09½
Imported fines, non-arsenical, ex-ship, per unit		10½@11c.

Pyrite prices are per unit of sulphur. A deduction of 25c. per ton is made when ore for furnace is delivered in large lumps.

SALT—

N. Y. com. fine 280 lb. bbl.		.72@1.13
N. Y. agricultural	sh. ton.	3.80@4.50

SALTPETER—

Crude	100 lb.	4.00@4.50
Refined, crystals	"	5.00@5.75

SILICA—

Ground quartz, ord'ry.	lg. ton	7.00@15.00
Silex, ground	"	7.00@15.00
Silex, floated	"	35.00@40.00
Lump quartz	"	5.00@5.50
Glass sand	"	2.75

SILVER—Nitrate, crystals—oz. .33½@.36¾

SODIUM—

Acetate	lb	.04½@.05
"Alkali," per 100 lb., 58/48		.90@.95
Bicarb. soda, per 100 lb		1.00@1.30
Soda, caustic, per 100 lb., 78/60		1.72½@1.85
Soda, caustic, powdered		.02½@.03
Salt cake, per 100 lb., bulk		.50@.60
Salt cake, bbl		.65@.85
Soda, monohydrate, per lb.		1.30@1.75
Bichromate	lb.	.05½@.06½
Bromide	"	.20
Chlorate, com'l	"	.08½@.09½
Cyanide, 120-130% KCN, per 100%		
Carloads (30,000 lb.)	lb.	18c.
5-ton lots	"	18½c.
Less than 5 tons	"	.20
Hyposulphite, Am.	"	1.30@1.50
Phosphate	100 lb.	2.10@2.40
Prussiate	"	.08½@.09
Sal soda, f.o.b. N. Y.	"	.60@.75
Foreign, f.o.b. N. Y.	"	.80@1.00
Silicate, com'l	"	.65@1.00
Sulphate, com'l (Glauber's salt)	100 lb.	.60@.80
Sulphate, com'l, calcined		.65@.85

STRONTIUM—Nitrate—lb. .07@.08

SULPHUR—

Louisiana (prime) to New York	lg. ton.	22.00 up
To Boston, Philadelphia or Baltimore	"	22.50 up
Roll	100 lb.	1.85@2.15
Flour	"	2.00@2.40
Flowers, sublimed	"	2.20@2.60
Powdered commercial, bags		1.55
Sicilian, extra qual., unmixed seconds, crude brimstone to New York	lg. ton.	$22.00

TERRA ALBA—Fr.&Eng. 100 lb. .70@1.00

TALC—

Domestic	sh. ton.	12.00@20.00
French	"	15.00@25.00
Italian, best	"	30.00@40.00

TIN—

Bi-chloride, 50°	lb.	.10
Crystals	"	.22½@.24
Oxide, lb.	"	.37@.40

URANIUM—Oxide—" 2.20@4.25

ZINC—

Chloride sol., com. 20°	"	.02½
Chloride, granular	"	.04@.04½
Dust	"	.06½
Sulphate	"	.02@.02½

NOTE—These quotations are for ordinary wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. In the cases of some of the important minerals, such as phosphate rock, pyrites and sulphur, in which there are well established markets, the quotations are substantially representative. But in the cases of some of the minor mineral products, the quotations represent what dealers ask of consumers and not what producers can realize in selling their output as a matter of private contract.

Mining and Metallurgical Companies—U. S.

Name of Company and Situation.		Shares. Issued.	Par Val.	Dividends. Total to Date.	Latest. Date.	Amt.
Alaska Mexican, g.	Alas	180,000	$ 5	$ 2,688,381	Aug. '10	$0.30
Alaska Treadwell, g.	Alas	200,000	25	11,535,000	Aug. '10	1.00
Alaska United, g.	Alas	180,200	5	739,130	Aug. '10	0.10
Amalgamated, c.	Mont	1,538,879	100	62,040,445	Aug. '10	0.50
Am. Sm.&Ref.,com.	U. S	500,000	100	18,000,000	July '10	1.00
Am. Sm. & Ref.,pf.	U. S	500,000	100	35,000,000	July '10	1.75
Am. Smelters, pf. A	U. S	170,000	100	4,730,000	June '10	1.50
Am. Smelters, pf. B	U. S	300,000	100	7,482,000	Sept. '10	1.25
Am. Zinc,Lead&Sm.	Kan	80,120	25	360,120	July '10	0.50
Anaconda, c.	Mont	1,200,000	25	46,500,000	Apr. '10	0.50
Argonaut, g.	Cal	200,000	5	1,130,000	Nov. '09	0.20
Arizona Copper, pf.	Ariz	1,266,120	1.20	1,290,418	Apr. '10	0.047
Arizona Copper,com.	Ariz	1,519,896	1.20	12,204,916	July '10	0.30
Atlantic, c.	Mich	100,000	25	990,000	Feb. '05	0.02
Bald Butte, g. s.	Mont	250,000	1	1,354,648	Oct. '07	0.04
Beck Tunnel, g. s. l.	Utah	1,000,000	0.10	675,000	Oct. '07	0.02
Boston & Montana.	Mont	150,000	25	70,625,000	July '10	4.00
Bull. Beck.&Cham.,g	Utah	100,000	10	2,728,400	July '08	0.10
Bunker Hill& Sull.	Ida	327,000	10	11,933,400	Aug. '10	0.30
Butte Coalition, c.s.	Mont	1,000,000	15	3,450,000	Sept. '10	0.25
Calumet&Arizona, c.	Ariz	200,000	10	11,300,000	June '10	1.00
Calumet & Hecla, c	Mich	100,000	25	112,050,000	June '10	7.00
Camp Bird, g s.	Colo	820,000	5	5,766,650	Oct. '09	0.24
Colorado, l. s.	Utah	1,000,000	0.20	2,210,000	June '10	0.08
Columbus Con., c.	Utah	285,540	5	226,832	Oct. '07	0.20
Con. Mercur., g.	Utah	1,000,000	1	3,385,313	Dec. '06	0.02½
Continental, z. l.	Mo	22,000	25	231,000	Oct. '08	0.25
Copper Range Con.	Mich	384,185	100	9,989,406	July '10	1.00
Creede United, g.	Colo	1,625,000	1	214,053	July '06	0.00½
Daly Judge, g. s. l.	Utah	300,000	1	225,000	Apr '07	0.37½
Daly West, g. s. l.	Utah	180,000	20	6,201,000	July '10	0.30
De Lamar, g. s.	Ida	80,000	5	835,200	Sept. '06	0.24
Doe Run, l.	Mo	65,749	100	2,349,751	June '10	1.50
Elkton Con., g.	Colo	2,500,000	1	2,591,960	Aug. '10	0.01½
El Paso, g.	Colo	2,450,000	1	1,389,045	Mar. '10	0.01
Fed. M. & Sm., com.	Idaho	60,000	100	2,708,750	Jan. '09	1.50
Federal M & S., pf.	Idaho	120,000	100	5,801,250	Sept. '10	1.75
Findley, g.	Colo	250,000	1	337,500	Sept. '06	0.01
Florence, g.	Nev	1,050,000	1	735,000	Apr. '10	0.10
Frances-Mohawk, g.	Nev	912,000	1	546,000	Jan. '08	0.05
Gemini-Keystone.	Utah	5,000	100	2,000,000	Aug. '07	10.00
Gen. Dev. Co.	U. S	260,000	100	2,639,000	Mar. '10	1.00
Goldfield Con., g.	Nev	3,558,367	10	11,027,076	Oct. '10	0.50
Grand Central,g.	Utah	250,000	1	1,331,250	Dec. '09	0.04
Granite g.	Colo	1,650,000	1	247,000	Dec. '09	0.01
Guggenheim Expl.	U. S	207,933	100	10,010,492	July '10	2.50
Hecla, s. l.	Idaho	1,000,000	0.25	2,030,000	Aug. '10	0.02
Homestake, g.	S. D	218,400	100	25,792,040	Aug. '10	0.50
Horn Silver, g.s.c.z.l.	Utah	400,000	25	5,642,000	Sept. '07	0.05
Imperial, c.	Ariz	500,000	10	300,000	June '07	0.20
Inter'l Nickel, pf.	N. Y	89,126	100	4,891,945	Aug. '10	1.50
Inter'l Sm. & Ref.	Utah	100,000	100	950,000	Sept. '10	2.00
Iron Blossom, s.l.	Utah	1,000,000	100	620,000	June '10	0.06
Iron Silver, s. l.	Colo	500,000	20	4,250,000	Apr. '10	0.10
Jamison, g.	Cal	390,000	10	370,500	Jan. '10	0.02
Jerry Johnson, g.	Colo	2,500,000	0.10	100,000	Dec. '09	0.01
Kendall, g.	Mont	500,000	5	1,275,000	Oct. '08	0.02
Liberty Bell, g. s.	Colo	130,551	5	228,353	June '09	0.15
MacNamara, s. g.	Nev	728,341	1	40,213	May '10	0.02½
Mammoth, g. s. l.	Utah	400,000	2.50	2,220,000	Mar. '08	0.05
Mary McKinney, g.	Colo	1,309,252	1	894,363	June '10	0.01
May Day, g. s. l.	Utah	800,000	0.25	108,000	Sept. '08	0.01½
Mohawk M. Co.	Mich	100,000	25	2,050,000	Feb. '10	1.00
Mont. Ore Purch.	Mont	80,833	25	9,437,274	Jan. '07	15.00
Nevada Cons., c.	Nev	1,151,200	5.00	2,157,900	Sept. '10	0.37½
Nevada Hills, s.g.	Nev	746,000	5	373,000	Dec. '07	0.10
New Century, z.l.	Mo	300,000	1	216,000	Oct. '09	0.01
Newhouse M. & S. c.	Utah	600,000	10	300,000	Sept. '07	0.50
New Idria, q.	Cal	100,000	5	1,260,000	July '10	0.30
New Jersey Zinc.	U. S	100,000	100	12,000,000	May '08	4.00
North Butte, c.	Mont	400,000	15	8,800,000	Mar. '10	0.50
North Star, g.	Cal	250,000	10	2,786,999	Sept. '10	0.40
Old Dominion, c.	Ariz	293,245	25	1,440,658	Jan. '10	0.50
OldDomin'n,M&Sm.	Ariz	162,000	25	1,225,500	July '10	0.25
Ophir, g. s.	Nev	201,600	3	1,816,360	May '08	0.10
OrovilleDredg'gLt.g.	Cal	700,000	5	1,383,036	Dec. '09	0.12½
Osceola, c.	Mich	96,150	25	8,958,650	July '10	4.00
Parrot, c. s.	Mont	229,850	10	6,807,649	Sept. '07	0.25
Phelps, Dodge & Co.	U. S	449,346	100	7,638,882	June '10	2.50
Portland, g.	Colo	3,000,000	1	8,617,080	July '10	0.02
Quartette, g. s.	Nev	110,000	10	375,000	July '07	0.20
Quincy, c.	Mich	110,000	25	19,192,500	Sept. '10	1.25
Round Mountain, g.	Nev	800,000	1	292,650	June '10	0.04
St. Joseph, l.	Mo	1,000,000	10	7,058,357	June '10	0.15
Shannon, c.	Ariz	100,000	10	450,000	July '07	0.50
Silver King Co't'n.†	Utah	1,250,000	5	1,659,885	Jan. '10	0.15
Sioux Con., s. l. g.	Utah	746,389	1	723,073	Apr. '10	0.04
Snow Storm, c.g.	Ida	1,500,000	1	982,500	Aug. '10	0.01½
Standard Con., g.s.	Cal	178,394	10	5,327,925	Jan. '10	0.75
Stratton's Independ.	Colo	1,000,000	5	5,395,865	Apr. '10	0.50
Swansea, g. s. l.	Utah	100,000	5	329,500	Mar. '07	0.05
Tamarack, c.	Mich	60,000	25	9,420,000	July '07	4.00
Tennessee, c.	Tenn	200,000	25	2,306,250	Dec. '09	1.25
Tomboy, g. s.	Colo	300,000	4.85	2,473,500	June '10	0.48
Tonopah of Nev., s g.	Nev	1,000,000	1	6,050,000	July '10	0.40
Tonopah Belm't, s.g.	Nev	1,500,000	1	600,000	Apr. '07	0.10
Tonopah Ext'n, s. g.	Nev	943,433	1	283,030	Apr. '06	0.15
Tonopah Midw'y,s.g.	Nev	1,000,000	1	250,000	Jan. '07	0.05
Uncle Sam, g. s. l.	Utah	500,000	1	340,000	Dec. '09	0.02
United Cop. com.	Mont	450,000	100	5,962,500	Aug. '07	1.75
United, c. pf.	Mont	50,000	100	1,500,000	May '07	3.00
United, z. l., pf.	Mo.-Kan.	19,556	25	312,782	Jan. '08	0.50
United Verde. c.	Ariz	299,927	10	.....	June '10	0.75
U.S.Sm.R.&M.,pf.	U. S	351,010	50	2,807,252	Apr. '10	0.87½
U.S.Sm.R.& M.,com.	U. S	486,044	50	6,826,011	Apr. '10	0.50
U. S. Red. & Ref. Pf.	Colo	39,458	100	1,005,504	Oct. '07	1.50
Utah, g. (Fish Sp'gs)	Utah	100,000	10	323,000	Feb. '09	0.02
Utah Con., c.	Utah	300,000	5	6,900,000	Jan. '10	0.50
Utah Copper	Utah	733,675	10	3,811,196	Sept. '10	0.75
Victoria, Utah	Utah	250,000	1	182,000	Dec. '09	0.02
Vindicator Con., g.	Colo	1,500,000	1	2,137,500	July '10	0.03
Wolverine, c.	Mich	60,000	25	5,700,000	Sept. '09	5.00
Work, g.	Colo	1,500,000	1	172,500	July '08	0.01
Yankee Con.	Utah	1,000,000	1	182,500	Jan. '07	0.03
Yellow Aster, g.	Cal	100,000	10	958,789	Aug. '07	0.20
Yukon Gold, g.	U.S.&Can.	3,500,000	5	1,400,000	June '10	0.10

Divided previous to consolidation. *$1,436,250. †$11,187,500.

Coal, Iron and Other Industrials—United States

Name of Company and Situation.		Shares. Issued.	Par Val.	Dividends. Total to Date.	Latest. Date.	Amt.
Allis-Chalmers, pf.	U. S	161,500	$100	$3,108,875	Feb. '04	$1.75
Amer. Ag.Chem., pf.	U. S	181,530	100	2,836,800	Apr. '10	3.00
American Cement.	Penn	200,000	10	1,388,000	July '10	0.10
American Coal.	Md	50,000	25	2,647,187	Sept. '10	0.75
Bethlehem Steel, pf.	Penn	150,000	100	900,000	Nov. '06	0.75
Cambria Steel.	Penn	900,000	50	10,585,000	May '10	0.62½
Central C. & C., com.	Mo	51,250	100	2,690,625	Jan. '10	1.50
Central C. & C., pf.	Mo	18,750	100	1,479,999	Jan. '10	1.25
Col.&Hock.C.&I.,pf.	Ohio	69,244	100	591,550	Oct. '09	1.50
Consolidated Coal.	Ill	50,000	100	350,000	July '04	1.00
Consolidation Coal.	Md	190,247	100	x17,591,510	Apr. '10	1.50
Crucible Steel, pf.	Penn	244,365	100	9,102,596	Sept. '09	1.50
Empire S. & I., pf.	N. J	25,000	100	1,008,033	Jan. '10	1.50
Fairmont Coal.	W. Va	120,000	100	1,980,000	Jan. '09	2.00
General Chem., com.	U. S	74,103	100	z3,464,313	Sept. '10	1.25
General Chem., pf.	U. S	100,000	100	7,155,000	Oct. '10	1.50
International Salt.	Penn	182,280	100	911,400	Dec. '06	1.00
Jeff.&Cl'f C.&I., cm.	Penn	15,000	100	330,000	Aug. '05	5.00
Jeff. & Cl'f C. & I., pf.	Penn	15,000	100	1,012,500	Aug. '10	2.50
Kern River Oil.	Cal	20,000	100	84,000	July '08	0.18
Lehigh Coal & Nav.	Penn	382,260	50	y18,268,900	Aug. '10	2.00
Maryland Coal, pf.	Md	18,850	100	2,061,122	June '09	2.50
Monon. R. Coal, pf.	Penn	100,000	100	2,324,000	July '08	3.50
Nat. Carbon, com.	U. S	55,000	100	715,000	Apr. '08	1.00
Nat. Carbon, pf.	U. S	45,000	100	3,071,259	Nov. '08	1.75
National Lead, com.	N. Y	206,554	100	4,386,015	Oct. '10	0.75
National Lead, pf.	N. Y	243,676	100	19,956,007	Sept. '10	1.75
Nat'l Steel&Wire,pf.	N. Y	25,778	100	631,561	May '06	1.75
New Central Coal.	Md	50,000	20	390,000	Nov. '08	0.40
New River Coal, pf.	W. Va	37,617	100	451,405	Nov. '08	1.50
Pacific Coast Borax.	Cal	19,000	100	2,086,500	Aug. '05	1.00
Peerless Oil.	Cal	92,000	10	711,000	June '08	0.06
Penna. Salt.	Penn	60,000	50	15,098,000	Oct. '08	3.00
Penna. Steel, pf.	Penn	165,000	100	8,662,500	Nov. '08	3.50
Phila. Gas, com.	Penn	664,800	50	*24,264,600	Feb. '09	0.75
Phila. Gas, pf.	Penn	120,000	50	2,850,000	Sept. '08	1.25
Pittsburg Coal, pf.	Penn	297,010	100	12,177,487	July '10	1.25
PocahontasC.C., pf.†	W. Va	28,000	100	336,000	July '09	3.00
Pocah'tasC.C., cm.†	W. Va	45,000	100	†406,800	Oct. '08	3.00
Republic I. & S., pf.	Ill	204,169	100	9,620,294	Oct. '10	1.75
Sloss-Sheffield, com.	Ala	100,000	100	2,508,000	Sept. '10	1.25
Sloss-Sheffield, pf.	Ala	67,000	100	4,572,400	July '10	1.75
Standard Oil.	U. S	970,000	100	697,422,000	Sept. '10	6.00
Tenn. C. & I., com.	Tenn	225,536	100	3,583,060	Nov. '07	1.00
Tenn. C. & I., pf.	Tenn	2,840	100	390,040	Nov. '07	2.00
Texas&Pacific Coal.	Texas	23,940	100	1,747,620	Apr. '09	1.50
Uni. Metals Selling.	U. S	50,000	100	5,875,000	Jan. '09	5.00
U.S. Steel Corp., cm.	U. S	5,083,025	100	116,387,717	Sept. '10	1.25
U. S. Steel Corp., pf.	U. S	3,602,811	100	269,414,620	Aug. '10	1.75
Va Carolina Ch., pf.	U. S	180,000	100	16,140,869	July '10	2.00
Warwick I. & S.	U. S	148,671	10	572,340	May '10	0.30
Westmoreland Coal.	Penn	60,000	50	8,880,000	Oct. '08	2.50

*Since 1894. †Since 1907. ‡Since 1890. xStock div. $6,130,000 Mar. '09. yStock div. $2,866,950 Jan. '10. z Stock div. 10 per cent. Mar. '10.

Canada, Mexico, Central and South America

Name of Company and Situation.		Shares. Issued.	Par Val	Dividends. Total to Date.	Latest. Date.	Amt.
Amistad y Conc'rdia	Mex	9,600	$ 50	$417,070	Apr. '08	$1.36
Batopilas.	Mex	446,486	20	†55,870	Dec. '07	0.12½
British Columbia, c.	B. C	591,709	5	236,683	Sept. '07	0.40
Buffalo, s.	Ont	1,000,000	1	767,000	July '10	0.08
Butters' Salvador, g.	Salv	150,000	4.85	2,764,500	.....	0.17½
Cobalt Central, s.	Ont	5,000,000	1	188,460	Aug. '09	0.01
Coniagas	Ont	800,000	5	1,280,000	July '10	0.15
Consolidated M. & S.	B. C	53,552	100	781,885	Nov. '07	1.25
Crow's Nest Pass.	B. C	160,000	25	2,058,648	Aug. '10	0.25
Crown Reserve, s.	Ont	1,750,000	1	2,158,828	July '10	0.15
Dolores, g. s.	Mex	400,000	5	1,044,866	Aug. '10	0.22½
Dominion Coal, com.	N. S	150,000	100	3,900,000	Jan. '10	1.00
Dominion Coal, pf.	N. S	50,000	100	3,865,000	Feb. '10	3.50
Dos Estrellas, g.s.	Mex	300,000	0.50	5,430,000	Jan. '10	0.50
El Oro, g.s.	Mex	1,147,500	4.85	7,026,286	June '10	0.36
Esperanza, s.g.	Mex	455,000	4.85	10,178,567	June '10	0.36
Granby Con.	B. C	135,000	100	3,778,630	Dec. '09	2.00
Greene Con. Copper.	Mex	864,000	10	6,194,400	Mar. '07	0.40
Guanajuato.	Mex	540,000	5	74,250	Oct. '06	0.07
Guanajuato D., pf.s.	Mex	10,000	100	244,356	July '10	3.00
Hedley Gold, g.	B. C	120,000	10	108,000	July '10	0.30
Hinds Con., g.s.c.l.	Mex	5,000,000	1	100,000	Feb. '08	0.02
Kerr Lake, s.	Ont	600,000	5	2,430,000	Sept. '10	0.50
La Rose Con., s.	Ont	1,498,407	5	1,678,019	July '10	0.10
Le Roi, Ltd., g.	B. C	200,000	25	425,000	Dec. '06	0.48
Le Roi No. 2, g.	B. C	120,000	25	1,004,400	Mar. '10	0.48
Lucky Tiger-Com.,g.	Mex	715,000	10	768,750	Aug. '10	0.05
McKinley-Darragh,s	Ont	2,247,692	1	809,168	Oct. '10	0.05
Mex. Con. M.&S. Co.	Mex	240,000	10	660,000	Mar. '08	0.25
Mex. Mill.&Trans.pf.	Mex	10,500	100	65,858	July '08	3.00
Mines Co. of Am.	Mex	2,000,000	1	3,845,000	Aug. '10	0.03
N. Y. & Hond. Ros.	C. A	150,000	10	2,940,000	Sept. '10	0.20
Nipissing, s.	Ont	1,200,000	5	4,575,000	Jnne '10	0.25
N. S. St.&Coal, com.	N. S	60,000	100	1,140,279	Jan. '10	1.00
N. S. St. & Coal, pf.	N. S	10,300	100	721,000	Oct. '09	2.00
Peñoles.	Mex	2,500	50	4,866,687	Dec. '07	10.00
Peregrina M. & M.,pf.	Mex	10,000	100	293,656	Mar. '10	3.50
Pinguico, pf. s.	Mex	20,000	100	420,000	Apr. '10	3.00
Reco, g.s.l.	B. C	985,000	1	332,482	Mar. '06	0.02
Right of Way Mines‡	Ont	1,685,500	1.00	392,063	Apr. '10	0.02
Rio Plata.	Mex	373,437	5.00	102,694	June '10	0.10
Securities Corp., pf.	Mex	2,000	100	42,699	July '08	3.50
Silver Queen, s.	Ont	1,500,000	1	315,000	Dec. '08	0.03
Temiskaming, s.	Ont	2,500,000	1	525,000	Apr. '09	0.06
Tem. & Hud. Bay,s.	Ont	7,761	1	1,288,326	July '10	3.00
Teziutlan Copper.	Mex	10,000	100	.....	Dec. '08	1.20
Tilt Cove, c.	N. F	44,500	9.72	318,620	Dec. '09	0.24
Trethewey, s.	Ont	1,000,000	1	461,998	Dec. '09	0.15
Tyee, c.	B. C	180,000	5	284,310	Aug. '07	0.63

†Since reorganization. ‡Previous to Jan. 1910, $324,644.